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MACKENZIE VALLEY PIPELINE INQUIRY

Government  
Publications

IN THE MATTER OF APPLICATIONS BY EACH OF

- (a) CANADIAN ARCTIC GAS PIPELINE LIMITED FOR A RIGHT-OF-WAY THAT MIGHT BE GRANTED ACROSS CROWN LANDS WITHIN THE YUKON TERRITORY AND THE NORTHWEST TERRITORIES; and
  - (b) FOOTHILLS PIPE LINES LTD. FOR A RIGHT-OF-WAY THAT MIGHT BE GRANTED ACROSS CROWN LANDS WITHIN THE NORTHWEST TERRITORIES,
- FOR THE PURPOSE OF A PROPOSED MACKENZIE VALLEY PIPELINE

and

IN THE MATTER OF THE SOCIAL, ENVIRONMENTAL AND ECONOMIC IMPACT REGIONALLY OF THE CONSTRUCTION, OPERATION AND SUBSEQUENT ABANDONMENT OF THE ABOVE PROPOSED PIPELINE

(Before the Honourable Mr. Justice Berger, Commissioner)

Yellowknife, N.W.T.

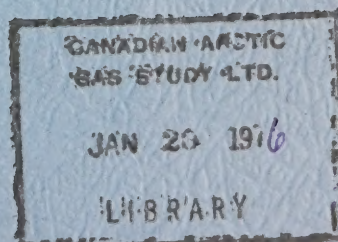
January 14, 1976.

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PROCEEDINGS AT INQUIRY

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Volume 109









E R R A T A

By N.J. Wilimovsky:

Volume 107

P. 16381, line 7 "in" should be "and"

Volume 108

P. 16465, line 28 "2000" should be "200"

P. 16548, line 7 "access" should be "accident"

P. 16550, line 6 "prove" should be "show"

P. 16580, line 2 "technical" should be "tactical"





APPEARANCES:

Mr. Ian G. Scott, Q.C.,  
Mr. Stephen T. Goudge,  
Mr. Alick Ryder and  
Mr. Ian Roland for Mackenzie Valley Pipeline  
Inquiry;

Mr. Pierre Genest, Q.C.,  
Mr. Jack Marshall, and  
Mr. Darryl Carter for Canadian Arctic Gas  
Pipeline Limited;  
Mr. Reginald Gibbs, Q.C.,  
Mr. Alan Hollingworth &  
Mr. John W. Lutes, for Foothills Pipe Lines Ltd.;

Mr. Russell Anthony &  
Pro. Alastair Lucas for Canadian Arctic Resources  
Committee;

Mr. Glen W. Bell and  
Mr. Gerry Sutton, for Northwest Territories  
Indian Brotherhood, and  
Metis Association of the  
Northwest Territories;

Mr. John Bayly  
or  
Miss Leslie Lane for Inuit Tapirisat of Canada,  
and The Committee for  
Original Peoples Entitle-  
ment;

Mr. Ron Veale and  
Mr. Allen Lueck for The Council for the Yukon  
Indians;

Mr. Carson H. Templeton, for Environment Protection  
Board;

Mr. David Reesor for Northwest Territories  
Association of Municipal-  
ities;

Mr. Murray Sigler for Northwest Territories  
Chamber of Commerce.





I N D E XPage

## WITNESSES FOR ENVIRONMENT PROTECTION BOARD:

Carson H. TEMPLETON

K.M. ADAM

Ian McTAGGART-COWAN

Norman J. WILIMOVSKY

Donald N. CRAIK

L.C. BLISS

Eric GOURDEAU

Stan THOMSON

- Cross-Examination by Mr. Scott (cont) 16583

## EXHIBITS:

402 "Guidelines for Environmental Training  
of Pipeline Construction Workers for  
the E.P.B." by Oetting & Doyle

16605





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Wilimovsky, Craik, Bliss,  
Gourdeau, Thomson  
Cross-Exam by Scott  
Yellowknife, N.W.T.

January 14, 1976.

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

CARSON H. TEMPLETON,  
K.M. ADAM,  
IAN McTAGGART-COWAN  
NORMAN J. WILIMOVSKY  
DONALD N. CRAIK  
L.C. BLISS  
ERIC GOURDEAU  
STAN THOMSON, resumed:

CROSS-EXAMINATION BY MR. SCOTT (CONTINUED):

Q Mr. Templeton, I understand  
you wanted to say something in the beginning about land  
use plans, is that correct?

WITNESS TEMPLETON: You promised  
that I could make one speech a day. I'll try and  
limit it but --

Q I went further than that,  
I said if you had a speech complaining about things we'd  
hear that too.

A Well, I'll try and incor-  
porate that into this one.

This is in regard to the  
question that you brought up yesterday about land use  
planning. I think the term is perhaps unfortunate,  
because it means different things to different people.  
I wondered if we could just go over<sup>it</sup>/as briefly as  
possible. In 1972 the Board recommended to the Govern-  
ment of Canada that a land use plan be prepared and  
we assumed that this was going to be a mackerel type of  
map or plan has had preserving areas for the whole  
north for certain uses, and I noticed that DIAND





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1  
2 in their budget several years items for broad land use  
3 planning, but I've never seen the results. I don't  
4 think that this Commission can attempt to make a land  
5 use plan for the north. All it can do, in my opinion,  
6 is to recommend how a corridor could fit into the  
7 eventual land use plan. I think we have to accept, at this  
8 late date, a corridor on the east side of the Mackenzie  
9 River, so that the best you can do is recommend how  
10 the plan -- how to plan that corridor. I think society  
11 and government has already made decisions in this  
12 corridor and I realize that the natives do not like  
13 some of these decisions, and by planning there is no  
14 attempt to pre-empt their land use claim. In fact,  
15 their claims are part of the planning process. They  
16 have made it clear and I'm sure everyone would agree  
17 that they are more interested in land than in money,  
18 and a proper land use plan should help them in the  
19 determination of what they want.

20 This morning Dr. McTaggart-  
21 Cowan and I sat down with an updated copy of our Atlas  
22 who shows in addition to the printed versions that are  
23 in evidence the route changes that have been proposed,  
24 trapping areas which we obtained from the native  
25 organizations, the Foothills proposal and a number of  
26 new site specific recommendations which showed up, which  
27 we prepared after reading the transcripts up until about  
28 October. It hasn't been updated since then.

29 With your permission, Mr.  
30 Commissioner, Dr. McTaggart-Cowan would like to read



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his hurried notes that we made this morning to indicate  
about as far as we think the land use planning can go  
and as practical for recommendation by this Commission.

THE COMMISSIONER: Fine.

WITNESS McTAGGART-COWAN: Mr.

Commissioner --

THE COMMISSIONER: Before you  
start, Mr. Waddell, I've got some stuff here for you.

A Mr. Commissioner, I'm not  
quite sure that my rather rough draft will go quite as  
far as Mr. Templeton indicated that it might, but I have  
attempted to set down certain elements that it seems to  
me are essential to the planning process, and to a  
degree can be filled from the data available.

The first essential to most  
land planning processes is comprehensive land capability  
study which can be done at different levels. This has not  
been completed for the area with which we are concerned.

A second essential and one  
that can be met in part is a comprehensive map overlay  
of present land use commissions. For example, village  
sites. Villages are present. Most of them, if not all  
of them, are likely to grow, and their needs should be  
recognized by land designation around each one to guide  
the direction of this growth





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1 to safeguard its water supplies, to permit for  
2 sewage and garbage disposal and perhaps fuel supplies and  
3 certainly recreational areas adjacent to each of these  
4 villages.

5                               Next, there are native special  
6 land use areas. There is already available a rough  
7 designation of the traditional, trapping, hunting and  
8 fishing areas used by each community. The Environmental  
9 Protection Board has attempted to insert these in its  
10 maps in the state which they now are. These have been,  
11 -- these are present on our updated maps which could be  
12 made available to you, sir, in Ozalid form.

13                           Then there are airports, wharves  
14 and other transportation commitments. Next, there is the  
15 Mackenzie Highway route which has already been designated  
16 through most of its length. There is the Dempster Highway  
17 route, again designated through most of its length.  
18 There are mining leases, petroleum exploration leases and  
19 supporting water rights, etc. There are areas that have  
20 been designated for national parks. There are a few,  
21 I believe, private land alienations or leases for  
22 lodges, service stations, etc. I think there are  
23 probably in government records, identification of some  
24 sites that have special potential for hydro power  
25 development. There are sites designated for the mining  
26 of gravel, etc. This is just a short list.

27                           Third, as a result of the  
28 present series of studies associated with the pipeline  
29 application, there have been identified areas of  
30 special capability for wildlife protection. I have





11 Fourth, there have already  
12 been identified several areas of special value for  
13 research. These are known as the I.B.P. sites and  
14 are on maps.

22 Sixth, there is already  
23 shown on our atlas several archaeological sites of  
24 importance and others will certainly turn up if, as and  
25 when any pipelining begins.

26                                 Seven, the negotiations  
27       leading to the settlement of the native land claims  
28       will constitute an important element in the land use  
29       planning process. It will almost certainly transfer  
30       some authority for land use decisions to the organizations





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1 of the native peoples. All of these could be placed on  
2 maps, superimposed as a second stage in the planning  
3 process.

4 In the absence of a comprehen-  
5 sive land capability document, and with the responsi-  
6 bility for making decisions regarding the routing of a  
7 pipeline and the placement of each of the special  
8 support facilities, decisions are pending which will  
9 pre-empt other land designations and will set the  
10 stage for much future development that may in some  
11 cases be at variance with the best use of the land as  
12 revealed by capability study.

13 It will be noted, for instance,  
14 that decisions made years ago in another context led  
15 to the building of DEW line sites at three points along  
16 the coast of the Yukon. The presence of these disturbed  
17 areas now becomes the rationale for using the same  
18 areas for wharfing and stockpiling of stock supplies if  
19 the Prime Route is used. The question as to whether these  
20 sites are the best suited in terms of capability to  
21 support this use or their former use has not been  
22 addressed, insofar as I am aware, in terms of public  
23 record.

24 The key questions then become  
25 for each site suggested, for somewhat major alteration,  
26 what is the capability of this site? What other uses  
27 are pre-empted if the proposed use is designated, and  
28 what alternative values are destroyed, with particular  
29 attention to the unique, the rare, the irreplaceable, or  
30 long-term values that are foreclosed by the proposed use.





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1 Arising from the pipeline environmental studies, some of  
2 the data required for the kinds of decisions I have  
3 raised, have been generated. Again, I would refer to  
4 the E.P.B. atlas. The graphic presentations of the  
5 potential conflict are indeed statements of some of the  
6 other local land use capabilities and can be interpreted  
7 as such. Many of the terms and conditions incorporated in  
8 our proposal for an environmental code are again  
9 focused in this same direction. That is as far as I was  
10 able to go, Mr. Commissioner, under relatively short  
11 notice.





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THE COMMISSIONER: Thank you,  
Dr. McTaggart-Cowan.

MR. SCOTT: Thank you, Dr.  
Cowan.

Q Now, Mr. Templeton, did  
you have one other thing? You look as if you had some-  
thing else to say.

Now, could we come onto the  
question of the environmental auditor? I hope I didn't  
put you gentlemen to too much difficulty last night, but  
I'd be grateful if you'd let me have your views about  
that role, either with or without reference to the  
experience in Alaska.

WITNESS WILIMOVSKY: We were  
prepared, sir, I just hadn't brought the material down for yesterday's  
session.  
The requested detailed and specific recommendations  
and the Board's suggestion for the establishment of an  
environmental auditor group are here presented. Much  
of the background has already been covered by our  
previous testimony. The recommendations which follow  
are in principle Board recommendations, but individual  
members may differ in their opinion regarding specific  
details. What follows, with the exception of the name,  
are not administrative nuts and bolts, but elements  
which we consider essential to the success of this  
auditor group.

The points to be elaborated are:  
Implementation, name, purpose and objective, membership  
including numbers, composition, qualifications, their



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1  
2 selection means, operation and staff, reporting require-  
3 ments, budget, funding, authority and powers, time frame,  
4 and termination. For each of these elements I shall  
5 touch upon the factors and/or alternatives in our  
6 recommendations. The operational tactics of the auditor  
7 group are not here considered.

8 Implementation. The auditor  
9 group should be an element of the terms and conditions  
10 of the project.

11 Name. This is not really  
12 important but should be reflective of the auditor  
13 group's task.

14 Purpose. Independent objective  
15 reporting of the success and the failure of the project  
16 in terms of its environmental impact, to audit in the  
17 degree to which the project is conforming to acceptable  
18 environmental protection practices, the efforts and  
19 extent of compliance of the companies including the  
20 labor force to adherence to environmental terms and  
21 conditions, and the extent to which the environmental  
22 terms and conditions are being enforced by government.  
23 Finally, to report the success as well as the failure  
24 of the project to the public.

25 Membership. In terms of  
26 numbers, large enough to be representative of the concerns  
27 of independent citizenry and small enough to be effec-  
28 tive. We do not hold that criteria such as aircraft or  
29 vehicle size, available accommodation space, and other  
30 artificial operational factors which have been suggested





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1  
2 or are being used elsewhere. This translates into  
3 between 9 and 11 individuals.

4 Qualifications. The auditor  
5 group should have membership composed of people with  
6 broad northern experience hopefully with a wide background  
7 of varied and appropriate disciplines that will be  
8 detailed in a moment.

9 Composition. Representative  
10 in a general but not specific way of northern peoples,  
11 preservationists groups, conservation groups (and I  
12 wish to emphasize these are different), recreational  
13 interests, development and utilization arenas, govern-  
14 ment and societal interests, and the international  
15 polar community. This group hopefully would include  
16 individuals with some competence in the biological  
17 and geophysical fields.

18 Their selection. There are  
19 several alternatives which should be examined in more  
20 detail. We recommend membership be elective through the  
21 following mechanisms, that nominations be invited from  
22 interest groups of the aforementioned areas that I've  
23 just gone through, for proposed general representation  
24 as well as from the independent citizenry for all but  
25 two members of the auditor group. A good start for  
26 sending the call for invitations out might be the mailing  
27 list of the Environmental Protection Board has developed  
28 for its publications. Over time this has expanded into  
29 a very broad spectrum of the environmentally concerned.  
30 I am sure this Board would be pleased to make this





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1  
2 compilation available. In addition, public notice for  
3 nominations could be placed in appropriate outlets. The  
4 nominations would be grouped by subject experience.  
5 The nominees would then be voted upon by subject groups  
6 by all concerned parties. The means of voting - the  
7 means of selecting the voting constituency is open to  
8 a number of alternatives. The nominations and elections  
9 to be supervised and held by a prestigious independent  
10 body and one recommendation might be the Royal Society  
11 of Canada, Canada Council, and others could be mentioned.  
12 The remaining two members of the auditor group would be  
13 selected by election of the membership of the auditor  
14 body itself, within their first three meetings, so as  
15 to accommodate any gaps left by the elected procedure.  
16 Replacement and rotation of membership is dependent on  
17 project life, and a recommendation on this point, though  
18 important, cannot be made at this juncture.  
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Operation and staff. The

Reporting requirements. Public

In addition, a formal annual

Budget. The acquisition of





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1 field logistic costs, such as aircraft time, substantial.  
2 The auditor group itself should receive compensation  
3 for their efforts.  
4

5 Funding. We believe the costs  
6 of the auditor group should be the responsibility of  
7 government in the project proponent in proportions to  
8 be established by negotiation. The alternative suggestion  
9 of funding through foundation seems unlikely a success  
10 in Canada. The funds should be set up as a trust or  
11 alternatively directed through an existing public  
12 foundation for administrative purposes only. Authority  
13 and power.

14 In addition  
15 to funds, acquisition of data requires having the  
16 authorization to have access to appropriate data of  
17 both the company and government and reasonable un-  
18 restricted access to the site. This authority should and  
19 must be stipulated by the body authorizing the project  
20 in appropriate confirmation made to the cognizant  
21 government and project groups. Such authority should  
22 include reasonable, but unlimited access to transportation  
23 and accommodation in the field at cost, noting that  
24 such transportation and accommodation may be required on  
25 short notice.

26 Time frame of the auditor  
27 body. The auditor body should exist at least during  
28 the construction in early operation phase of the project.  
29 That is to include the shake down or debugging phase  
30 when the probability of non - normal practices are





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1 highest. Selected impacted areas may require a continuing  
2 study and auditor group may or may not be required for  
3 the mature project activities.

4 Termination. The initial  
5 terms of reference should define the orderly termination  
6 of the auditor group including an analysis of the  
7 auditor's body effectiveness in recommendations for  
8 any future such group. These are the recommendations  
9 requested by Mr. Scott.

10 MR. SCOTT: Thank you, Dr.  
11 Wilimovsky. If there is nothing more to be said on that  
12 by any member of the Board, let me turn to another  
13 topic.

14 Q Mr. Templeton, on June  
15 the 4th you indicated that the E.P.B. believed that  
16 the cross-delta route, and I use quotations here,  
17 "should be deleted from consideration at this time  
18 because there is insufficient information to form an  
19 opinion about it." Since that time, of course, Arctic  
20 Gas has filed with the Inquiry a considerable amount  
21 of information about this route and what I would like  
22 to know, is if the Board has made any assessment of  
23 the adequacy of that information for the purposes of  
24 forming an opinion about the route, and I asked that  
25 particularly in view of the fact that the Board  
26 members may or may not appear before the Inquiry  
27 again when the cross-delta route is under review.

28 So, really two questions. First  
29 of all, has the Board any comment on the adequacy of  
30 the information about cross-delta that is available in



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1 order to enable opinions to be formed and secondly, if  
2 that information is adequate, have you been able to  
3 form an opinion and what are your views about the  
4 cross-delta proposal?  
5

6 WITNESS TEMPLETON: The Board  
7 as a board has not studied the cross-delta route because  
8 it did not have the funding to do so. Individuals may  
9 have opinions about the inadequacies, although the  
10 impact assessment has been only received in the last  
11 week, I believe, so I am not sure that we should even  
12 comment on the adequacy because we have had a pretty  
13 short look at it.  
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1  
2 The same applies to the Fort  
3 Simpson relocation, although we've had that for some  
4 time but I think we felt that it was inadequate in a  
5 number of areas, and I think the applicant is saying  
6 that they're going to do a great deal more work in it.  
7 For example, in the geotechnical end I think there are  
8 only one or two drill holes available to us. Perhaps  
9 there are more but I think that's all we have, and it  
10 would be inadvisable, I think, to express an  
11 opinion on that amount of information, particularly  
12 when there are some rather serious terrain problems  
13 anticipated.

14 Q Well, I understand that  
15 to be the position of the Board as an entity, but the  
16 situation which we find ourselves in now is that the  
17 prime route is what is it, 50 or 55% different than the  
18 route that the Board considered. That's nobody's fault.  
19 That's the way it is, and what I'd like to ask the  
20 members of the panel, particularly with reference to  
21 the cross-delta or the Fort Simpson route changes,  
22 whether they as individuals have any views about the  
23 adequacies of those amendments, the adequacies of  
24 the information base, or the adequacies of the amendments  
25 themselves. Dr. Bliss?

26 WITNESS BLISS: Mr. Scott,  
27 maybe I could lead off on this. Again, starting off  
28 with the qualification that we obviously haven't  
29 studied this in detail, but on the basis of the infor-  
30 mation that we have in hand and our general knowledge





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1  
2 at least on a vegetation basis I see no great problems.  
3 It will not be possible to revegetate the line across  
4 the delta in the same manner as in an upland area. We  
5 know that now from reseeding well sites in that portion  
6 of the delta, so that seed mixes to stabilize soil aren't  
7 going to work very well because you get an annual  
8 application of silt. So that any revegetation that  
9 is done is clearly going to have to be done by the use  
10 of stems of willow shrubs, as has been recommended in  
11 some areas, and by the use of sedges and other things.  
12 But I personally don't view this as a serious environm-  
13 ental impact that this will jeopardize the integrity of  
14 the line or of the site conditions in that portion of  
15 the delta.

16 WITNESS MCTAGGART-COWAN: I  
17 would like to emphasize what Mr. Templeton said. I got  
18 the report on the cross-delta route so recently that  
19 I simply haven't had any time to look at it at all, but  
20 I would be prepared to look at it and write to you. I  
21 know that makes it in a very different context, but  
22 write to you of any concerns that I have.

23 Q I'd be very grateful  
24 for that, Dr. Cowan. I'll bring that to the attention  
25 of the other participants. What I fear here is that these  
26 two important matters will develop and this panel will  
27 not perhaps have been heard from on those subjects.  
28 Is there anybody else who would like to make any comments  
29 on either of those route changes? Dr. Thomson?

30 WITNESS THOMSON: Again with



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1  
2 the proviso, Mr. Scott, that we haven't really looked  
3 in great detail at this, I feel that the problems that  
4 will come up on the cross-delta route are, except for  
5 Shallow Bay, not new problems. There will be, for  
6 example, concerns about frost heaving at the pipe,  
7 perhaps about thaw subsidance, bank instability. These  
8 problems have already been addressed on other parts of  
9 the line and research work is going on, as far as I  
10 know. So from that point of view, the line really does  
11 not pose problems that are brand new to the project.

12                   However, there will be site  
13 specific problems that may have to be looked at in  
14 detail on that specific site when the line is actually  
15 laid out on the ground, and two of these appear to me,  
16 one of which is Shallow Bay itself, and there are, I  
17 think, mitigative measures that may be brought in to  
18 ease those; but normally when you're that far down in  
19 the delta you have permafrost right at the ground  
20 surface or very close to it when you're on land or on  
21 the islands, for example. Then you get into some of  
22 these channels and there's either a window in the  
23 permafrost or a very deep depression of the permafrost  
24 table and right at the bank the permafrost table is  
25 descending very steeply and although one or two of  
26 these may not be a problem, there are many of these  
27 crossing, many of the channels in the northern delta  
28 area.

29                   Q     Mr. Craik?

30                   WITNESS CRAIK: There's one





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1  
2 area of research that seems to be involved clearly  
3 within the terms of reference of the studies undertaken  
4 by the pipeline companies, but nevertheless, which have  
5 been pin-pointed as a problem. That is the question of  
6 aircraft overflight, and just I thought it might be  
7 worth the comment that just having viewed the research  
8 that has been done, it's been a good effort that has  
9 been done in relation to predicting impacts of aircraft  
10 overflights, but I think that probably there's room  
11 for -- if this is in fact a major concern, and it appears  
12 to be, this business of aircraft flights at certain  
13 times of year and elevations and this sort of thing --  
14 I think there's room for <sup>a</sup> much more broadly based study  
15 that takes into account not just experimental work but  
16 work which will look at the historical impact of aircraft  
17 flights. We've made predictions, for instance, from  
18 -- on elevations. I would assume that the aircraft  
19 flights between Aklavik and Inuvik, for instance, that  
20 have been going on for decades, and charter flights  
21 have probably been on an average much lower in elevation  
22 than what we're calling for. I think that on other parts  
23 of the delta, which are regarded as fairly critical and  
24 along the coast which are regarded as critical, it's  
25 a much bigger project and I think that neither of the  
26 companies have been able to mount , but nevertheless  
27 have been pin-pointed as a major area of concern because  
28 transportation, despite a few more roads and what-not,  
29 is still going to be primarily by air in the north.  
30 There's going to be increasing density in all parts of



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1  
2 that area, the delta and the coast. So it's -- my comment  
3 is more by way of putting in a plug for an orientation  
4 to research there, which may fall outside the responsi-  
5 bility of the pipeline companies alone, and more in the  
6 area of a general responsibility that governments might  
7 address themselves to.

8 Q Any other member of the  
9 panel want to comment on this? Mr. Templeton?

10 WITNESS TEMPLETON: This isn't  
11 a complete list, I don't think. I had a quick look at  
12 it, perhaps more than the others. I didn't see an  
13 assessment of the effect of the increased levels of  
14 human activity in the delta covered by construction and  
15 operation of a gas pipeline, or the resultant increase  
16 of access to the area. Now, I recognize that the pipe-  
17 line is only part of a very major amount of effort of  
18 drilling wells and gathering systems and everything, but  
19 it's very important. The only mention of human  
20 activity in excess is in the mitigative measure section,  
21 I think, where the applicant states that due to the  
22 nature of summer activity and restrictions on vehicle  
23 traffic, human presence will be confined to construction  
24 sites. I'm not sure that there is a great deal of  
25 summer activity in connection with this. The applicant  
26 does not specify, I don't believe, exactly what controls  
27 on personnel and what restrictions in traffic would  
28 be enforced, nor does the applicant account for all  
29 of the induced and related activities in the infra-  
30 structure that will result from the pipeline.





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1 I don't think that there is  
2 any mention of the implications of the cross-delta  
3 route on the native use of the resources of the area,  
4 and if you look at the maps prepared by COPE  
5 regarding the use of the delta, you will find that it is  
6 very intensely used and that I think that this has to  
7 be taken into account. I don't think that you can just  
8 brush those native uses aside.

9 There is no assessment of  
10 impact of a major oil spill in the delta. The mitigative  
11 measures section of the assessment of the applicant  
12 promises that fuel storage and shipment will be conducted  
13 in accordance with government regulations and that  
14 appropriate oil spill clean up arrangements will be  
15 made.

16 However, I believe that in  
17 spite of the best intentions, a major oil spill will be,  
18 of all the activity that is going to go on in the  
19 delta, is quite likely. Now, I am not blaming that  
20 all on the pipeline company and I recognize there the  
21 amount of oil that they have is small in comparison  
22 to the gathering systems and the oilwells, but it is  
23 adding another risk for construction oil to be spilled  
24 into the delta and I think that we have seen that this  
25 has happened in the Alyeska Pipeline and undoubtedly it  
26 will happen in some places in this pipeline.

27 I don't believe there is an  
28 assessment of the region, national or even global  
29 significance of changes which might occur in the only  
30 major delta if there is this oil spill, and once again I



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1 don't think that we can saddle this pipeline company  
2 with all of the activities in the delta and perhaps I am  
3 going too far into your next phase, Mr. Commissioner, but  
4 since I won't be there I wanted to comment, and I would  
5 like to repeat what Dr. Thomson said, that there is no  
6 assessment of the magnitude of the problems between  
7 the interaction between the cold pipeline and the  
8 unfrozen areas in this area where the permafrost is  
9 in a very jumbled up state due to the movement of the  
10 delta over the years.

11  
12 Now, those were the comments  
13 that I had from an hour and a half's look at it.

14 MR. SCOTT: Dr. Bliss.

15 WITNESS BLISS: Maybe just  
16 one other point in relation to the delta crossing. When  
17 Dr. Thomson and I attempted this crude, semi-quantitative  
18 evaluation of routes, we included this one too in the  
19 sense of the coastal route via the Mackenzie Delta  
20 crossing, versus the coastal route via Aklavik, the  
21 original prime, and the final summation of this showed  
22 that the cross-delta coastal routing fell intermediate  
23 in its total impact as we assessed this in relation to  
24 the original coastal which was the least and the  
25 interior which was the most. So that it appeared again,  
26 on the basis of the criteria that we used, and the  
27 quantifications that we used, that shifting the coastal  
28 route from the original to the new location increased the  
29 impact.

30 Q Did you include the  
shorter length of the coastal route? I am sorry, the





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1 cross- delta ?

2 A Not per se in a quanti-  
3 fication basis, no.

4 Q Well, wouldn't that be  
5 a factor?

6 A Yes.

7 Q I was tempted, Dr.  
8 Bliss, to press you about the quantification process,  
9 but Dr. Fyles tells me I won't get anywhere, so I will  
10 just leave that for the time being. Did anybody  
11 else have any comments that they wanted to make on  
12 the adequacy of the information base provided by Arctic  
13 Gas or on the route itself for the Cross-Delta route?  
14 If not, we will move on to something else.

15 In the transcript Mr. Craik  
16 reported that the Board had prepared and presented to  
17 the sponsor a report dated July 1973, entitled "Guidelines  
18 for Environmental Training of Pipeline Construction  
19 Workers", and that report in its blue binder has now  
20 been produced. I would ask, Mr. Commissioner, that it  
21 should be made an exhibit, if that be permitted.

22 WITNESS TEMPLETON: Yes, I  
23 am sorry, Mr. Scott, we somehow or other slipped up  
24 in June of making it as an exhibit and will do that  
25 now.

26 (GUIDELINES FOR ENVIRONMENTAL TRAINING OF  
27 PIPELINE CONSTRUCTION WORKERS FOR THE E.P.B.  
28 JULY, 1973, REVISED MAY, 1974, OETTING AND DOYLE,  
29 MARKED AS EXHIBIT 402)  
30



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Gourdeau, Thomson  
Cross-Exam by Scott

1 MR. SCOTT: I gather from  
2 what you have said in commenting on this report that  
3 rather than creating a training scheme, it provides a  
4 strategy for the development of a training scheme. I  
5 wonder whether you or the Board feel that any of the  
6 proposals that you have made in it and which were made,  
7 of course, before July 1973 require revision in the  
8 light of events since that time?

9 A I am not sure that I  
10 can answer it. I haven't reviewed it recently. I  
11 imagine that it should be updated. I think Canadian  
12 Arctic Gas took sections out of it and adopted them. I  
13 don't believe they adopted the commitments that we  
14 put in it. I think, if I remember rightly, Foothill's  
15 comments were fairly general, that they would do one,  
16 but I think that one of the thrusts of this report is  
17 the somewhat urgent nature to get started with the  
18 planning of it, because it takes quite a lot of time and  
19 it needs to have some relationship with the government  
20 agency to determine what is acceptable.

21 Q Well, for example, Mr.  
22 Templeton, the cross-delta proposal, which of course  
23 has been made since that report of yours, calls for  
24 summer construction, not only on river crossings, but on  
25 a very substantial section of route and is really the  
26 first substantial proposal for summer construction on  
27 the pipeline project that has been made. Now, what I  
28 am saying is that that may involve worker control  
29 problems that haven't been addressed in your report and  
30 have you anything to say about that? Is that a possibility





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Gourdeau, Thomson  
Cross-Exam by Scott

1  
2 or is it not?

3 A Oh, yes.

4 MR. MARSHALL: Could you  
5 be specific about that, Mr. Scott?

6 MR. SCOTT: About what?

7 MR. MARSHALL: About the  
8 summer construction.

9 MR. SCOTT: Well, I understand  
10 that across the delta there is substantial summer  
11 construction proposed, whereas on the other parts of  
12 the project the only summer construction may relate  
13 to river crossings.

14 MR. MARSHALL: I am informed  
15 that it is just river crossings.

16 THE COMMISSIONER: Well, that  
17 would include Shallow Bay. Let's put it on a hypothetical  
18 basis so that we don't get bogged down in this. Mr.  
19 Scott is concerned about workers in the summer wanting  
20 to hunt and fish, I suppose.

21 A Well, there are quite  
22 a few, there are more than river crossings in the summer-  
23 time, there are the compressor stations and the wharves and  
24 the barging, and so there are a lot of summer activities  
25 anyway.

26 MR. SCOTT: I suppose, Mr.  
27 Templeton, the point that I was making is that whatever  
28 may be said about construction in the valley, even if  
29 the cross-delta construction in the summer be restricted  
30 to water crossings, it is obviously by the nature of the



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1 terrain going to bring many more people into the  
2 delta in the summer time than might be brought into the  
3 valley in the summer time for compressor station and  
4 river crossing construction alone, and I am simply  
5 asking, are there any implications for your training  
6 strategy that are inherent in that development?  
7

8 A I am not sure that it would  
9 change the strategy. I don't really think it would. The  
10 thing that would change the strategy the most, I think,  
11 is what the government is going to do. You know, how  
12 these two organizations are going to interface and how  
13 the training would be brought together. I don't think  
14 the cross-delta route would change that, I am not sure.  
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Templeton, Adam, McTaggart-Cowan  
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Gourdeau, Thomson  
Cross-Exam by Scott

1  
2 Q Well now, Mr. Templeton,  
3 do you or any other members of the panel have any  
4 comment on the statements on environmental training  
5 that have been made by either of the applicants, either  
6 in these hearings or elsewhere? How do they accord with  
7 your proposals?

8 A Now I'm doing this entirely  
9 by memory, and I don't think we disagree except that  
10 they're not as complete and contain commitments that  
11 we would like to see. I don't think there's a basic  
12 disagreement on what they have, but I'd like to see them  
13 go a lot farther.

14 Q Well, where would you  
15 like to see them go? Answer that broadly or narrowly.  
16 Mr. Craik or Mr. Gourdeau?

17 WITNESS GOURDEAU: Well, I had  
18 an idea sometime that maybe it would be wise for the  
19 company to disassociate certain functions of the educa-  
20 tional training of the workers, not the inspectors but  
21 the workers, and I wondered if it would not be good for  
22 them to consider the possibility of introducing in the  
23 process an outside organization like Frontier College  
24 or something like that for psychological reasons. If  
25 the environment is presented to ordinary workers by  
26 the company as being important, it could become part of  
27 the tough requirements imposed on the workers by the  
28 company. If it would be done by an outside organization  
29 in the camps of the company, on a regular basis, and  
30 it would be an independent organization, the workers



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1  
2 would understand that it would be their work to do that  
3 and maybe psychologically it would have a good chance  
4 to bring better results and also it could maybe permit  
5 to involve more native people in the educational work  
6 of this body. I think it would be very difficult if the  
7 company, with the good intentions it has, would involve  
8 native people in this, and they would not be satisfied  
9 with their work or the native people would feel that  
10 they work too much for the company when they work for  
11 the environment. I think it maybe could be something  
12 there. There should be -- maybe there should be advantage  
13 to call on an external body in order to help them to  
14 educate the people in the camp.

15 Q Mr. Craik?

WITNESS CRAIK:

16 A Mr. Scott, I think one of  
17 your questions or part of it was whether or not the  
18 plans of the company that have been examined by us are  
19 adequate. I think Mr. Hemstock made reference in December  
20 testimony to a report that was expected by the company  
21 tentatively at that time. I don't know if the company has  
22 it available but we haven't seen it, the report referred  
23 to by him.

24 Q Well, I don't think it's  
25 been filed with the Inquiry either, so you're not alone  
26 because I haven't seen it. But is that your answer,  
27 that having not yet seen that you can't make a judgment?

28 A We haven't seen any detail,  
29 but if there's a new report there's obviously more  
30 information available but we haven't got it yet.





Templeton, Adam, McTaggart-Cowan  
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CrossExam by Scott

1  
2 Q Anybody else on the  
3 subject of employee training? Well, do you have that  
4 report yet or is not yet available?

5 M R. MARSHALL: It's not yet  
6 ready.

7 MR. SCOTT: Is there any time  
8 frame that we can be advised as to when we may  
9 expect it?

10 MR. MARSHALL: I understand  
11 from Mr. Hemstock that it's a report being prepared  
12 by Ursa and it's expected within a few weeks.

13 MR. SCOTT: Q Now, Dr. McTaggart-  
14 Cowan, in the transcript, pages 6180 and 81 you recommen-  
15 ded that flight corridors be established over the delta  
16 north of a line joining Aklavik, Old Reindeer Station,  
17 and Sitidgi Lake, to minimize disturbance to waterfowl,  
18 and there are elsewhere in the assessment made by the  
19 Board reference to flight corridors in the delta. Where  
20 would you locate these flight corridors?

21 WITNESS McTAGGART-COWAN:

22 Sorry, Mr. Scott, I haven't got enough data to permit  
23 such a designation. This was a strategy recommendation  
24 rather than a detailed placement recommendation. The  
25 objective is to confine the -- what disturbance will  
26 inevitably take place, because there has to be a lot of  
27 transport across the delta, it has been going on for  
28 many years and if you contract it within a relatively  
29 narrow frame, rather than spreading it out, the general  
30 strategy was believed to be that this would reduce the



Templeton, Adam, McTaggart-Cowan  
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Cross-Exam by Scott

1  
2 overall impact.

3 Q It's a kind of corridor  
4 concept, isn't it?

5 A That is right.

6 Q And I take it that  
7 the theory of it is --

8 A Air corridor.

9 Q All right, and the theory  
10 of it is that you recognize the inevitability of impact  
11 and in effect concentrate it in one or more selected  
12 areas.

13 A Yes sir.

14 Q Is that -- I take it that  
15 the Board accepts that general proposition, does it,  
16 that that is the way you deal with inevitable impacts?

17 A No sir, I don't think  
18 you could generalize from the particular to the general.

19 Q All right, well that's  
20 the way you deal with air impacts in the delta.

21 A In that part of the delta,  
22 yes.

23 Q How wide would these  
24 corridors be in your strategy?

25 A As narrow as possible.

26 Q Well, has any thought  
27 been given to that -- to the criteria?

28 A I think, sir, that the  
29 Department of Transport has its concepts of what  
30 tolerable air corridors must be to accommodate certain





Templeton, Adam, McTaggart-Cowan  
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1 densities of traffic. The reasoning that led to my  
2 suggestion, and I think the Board accepting it, was that  
3 this is an area where landings and takeoffs are going  
4 to be taking place of float aircraft, so there will be  
5 inevitably low altitude passage. So that it would be  
6 impossible for the aircraft to fulfill any altitude  
7 specifications. This is a problem wherever you have  
8 landings and takeoffs taking place, it's a question of  
9 the descent and the takeoff. The takeoff causing  
10 a great deal more noise than the landing, unless the  
11 landing has a lot of reverse thrust for rapid braking  
12 which then causes a lot of noise.  
13

14 Q Well, apart from  
15 referring to the principle of corridors the way you have,  
16 has the Board been able to go any further in developing  
17 a strategy for their location, the interests specifi-  
18 cally that are designed to be protected by the estab-  
19 lishment of corridors, and the relative placement of  
20 corridors, the numbers and so on? Have they been able  
21 to deal with any of those things?

22 A Not in that degree of  
23 detail, sir. The areas where I recall being parti-  
24 cularly concerned was the crossing of the Mackenzie  
25 area in the Norman Wells vicinity up north where the  
26 islands in the river are used extensively in the early  
27 spring, we suggested that crossings be confined to a  
28 corridor there; and in the delta itself. Now the  
29 designation of the corridor requires more site specific  
30 information than we have available.



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Cross-Exam by Scott

1  
2 As has been mentioned already,  
3 there is an awful lot of flying back and forth across  
4 the delta between Aklavik and Inuvik at low elevations  
5 for many years.

6 Q Well, Dr. Cowan, doesn't  
7 it also involve fairly sophistocated tradeoffs in the  
8 selection of crosses between --

9 A Yes, it does.

10 Q -- when you determine the  
11 area you want to protect and conversely the area on  
12 which you're prepared to inflict maximum damage, you've  
13 made a very sophistocated judgment as to what environ-  
14 mental interest is important, and the extent to which  
15 it can or should be protected. Isn't that so?

16 A You've expressed it very  
17 well indeed.

18 Q Has any work been done  
19 toward development of that type in the delta, or are  
20 we still talking about a general principle?

21 A We're still talking about  
22 a general principle.

23

24

25

26

27

28

29

30





1 Q One small matter that  
2 I would like to deal with. Dr. McTaggart-Cowan, on  
3 page 6185 in dealing with falcons' nests, you say, and  
4 I don't, of course, quarrel with this, that there are,  
5 quote, "quite easy remedies for the problem of  
6 protecting the falcon nests particularly from disturbance"  
7 and then you go on to detail some general avoidance  
8 measures that could be applied. Then at page 6232 Mr.  
9 Templeton speaking in a slightly different context  
10 says, "Although there will be thousands of construction  
11 workers, it is the other personnel that concern us:  
12 senior managers, logistics planners, control surveyors,  
13 support staff, and visitors, to name a few, will generally  
14 be more widely spread out and not as easily controlled.  
15 Many will have access to helicopters and fixed wing  
16 aircraft, and hence, the potential to harass wildlife"  
17 Now, the difficulty is that I see a kind of conflict  
18 in these two statements in the sense that you begin  
19 by saying, well, dealing with falcon nests the  
20 control remedies are well-known and easily applicable,  
21 and really what you are talking about is that they  
22 are applicable to construction crews, isn't that so?

23 A You  
24 are quite right. I think that in listening to those  
25 two statements, put into context I would take out the  
26 word "easy".

27 Q Well, it goes further  
28 than that, doesn't it?

29 A Yes, it does.

30 Q Because it is not only not



Templeton, Adam, McTaggart-Cowan  
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1 easy, it may be that there is not a solution if the  
2 dimension of the problem extends beyond easily controlled  
3 construction crews in manageable numbers and extends  
4 to all the persons from managers and suppliers to  
5 casual pipeline visitors that may seek access to the  
6 site.

7 A Sir, probably the  
8 most appropriate reference point would be the experiences  
9 in Great Britain where there has been very serious  
10 attempt to protect the nesting sites of the few remaining  
11 golden eagles, falcons, etc., ospreys, particularly.  
12 It was found necessary in the case of the osprey to  
13 have a guard permanently stationed within site of the  
14 nest, and even under those circumstances, he caught  
15 somebody halfway up the nest tree one night, it is  
16 extremely difficult to protect these rare species which  
17 are sought after by collectors of eggs, which the  
18 egg collectors are fortunately going out of style, for  
19 young birds for falconry, for well wishers who merely  
20 want to get so close that they can take a good  
21 photograph, and each of these has very harmful impact,  
22 and certainly I had in mind that I much agree with  
23 you. Our concentration was at that time on the  
24 organized part of the process, not the introduction  
25 of many more people which has been our major concern  
26 expressed over and over again, that the real problem  
27 is access to many more people.

28 Q Well, if we recognize that  
29 that your response and the response of others has been  
30 to the damage occasioned by construction crews and



Templeton, Adam, McTaggart-Cowan  
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1 limited to that, and if we stepped back and recognized  
2 that what you just said applies not only to protection  
3 of falcon sites, but applies much more broadly to a  
4 protection of a whole range of environmental interests,  
5 you would agree with that, wouldn't you?

6 A Yes, sir.

7 Q What I want to ask you  
8 is this: is there in the plans of either of the  
9 applicants, or indeed in the strategy of the Board,  
10 any approach to this problem, that is, the problem  
11 that access creates? Have either of the applicants,  
12 as far as you can see, made a -- taken a step in this  
13 direction?

14 A No, sir. I would have  
15 to say that I don't think that any effective means  
16 of handling this has been proposed.

17 Q Has any means been  
18 proposed, even whether effective or not? Has the  
19 problem been addressed, as far as you can judge, by  
20 the applicants?

21 A We did, up to a certain  
22 extent. The Canadian Wildlife Service, the Northwest  
23 Territories administration are doing this to an  
24 extent now. They have their regulations regarding  
25 the accessibility of falcon sites, permits are  
26 required to export, to capture. They have found  
27 transgressors, they have seized individuals that had  
28 young birds in their possession and have taken them  
29 to court and fined them. The effort is really an  
30 educational one as much as a protection one, and an





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1 enforcement one.

2 Q Well, Dr. McTaggart-Cowan,  
3 would you agree with me that the way the public, government  
4 or the public responds to this problem of access, not  
5 only from, in response to pipelines, but other industry,  
6 in the environmental field, is by the development of  
7 game management plans as a start? There may be other  
8 techniques.

9 A Yes, sir.

10 Q All right, and therefore,  
11 one would have -- let me put it this way: if either  
12 of the applicants were to approach the problems created  
13 by increased access and attempted to develop a  
14 strategy to deal with those problems, I take it that  
15 one of the things that they would look at is an adequate  
16 game management plan.

17 A Yes, sir.

18 Q And therefore, would you  
19 agree with me that an adequate game management plan is  
20 the joint responsibility of the public in whose interest  
21 it should exist and those whose activities either  
22 make it necessary or expedite the necessity for it?

23 A We are getting back to  
24 the point where were yesterday in an area, in another  
25 discussion. I think it was Mr. Veale raised the same  
26 kind of question in another context as to at what point  
27 does the bonding take over or leave off and the  
28 impact, at least the responsibility of society generally  
29 take over. I find this a very difficult one to reason  
30 out. DURING the course of construction we feel that the



Templeton, Adam, McTaggart-Cowan  
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1 bond would be applicable to activities of construction  
2 personnel, but when you come to the very newly created  
3 access which will be demanded by Canadians and visitors  
4 to Canada, I agree with you that there is the joint  
5 responsibility in theory, but when you look at  
6 Canadian practice, up to this point in time, I am not  
7 aware that there are too many instances in which the  
8 developer, who has been given the permission to  
9 develop, has been held responsible for the downstream  
10 consequences of opening up access.

11 There have been cases where  
12 this is done, particularly in the management of deer  
13 herds that are opened up to access via the intrusion  
14 of forestry roads, this kind of thing.

15 Q Well, you see, one of  
16 the things that concerns me and we don't have to  
17 trouble about whether this has ever been done before,  
18 this may be the place to start.

19 A That is right.

20 Q But one of the things  
21 that concerns me is that when a developer builds a  
22 subdivision, it is now routinely part of his obligation  
23 to provide parkland for the use of the subdivision that  
24 he has created.

25 A Yes, sir.

26 Q And really what I am  
27 directing myself to is not whether the developer  
28 should have responsibility in the sense of decision  
29 making, political responsibility, but whether, we must  
30 now begin to regard the developer as having a responsi-





Templeton, Adam, McTaggart-Cowan  
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Cross-Exam by Scott

1 bility for providing the resources necessary to  
2 develop game management plans or other such control  
3 devices.

4 A The developer is  
5 seldom competent, sir, to do the job, but certainly  
6 it would be helpful if the consequences of developers'  
7 actions was recognized as one of the -- the ameliorations  
8 of these consequences was recognized as one of the  
9 responsibilities of those who seek to use land for  
10 purposes of this sort.

11 Your question of game management,  
12 sir, it is a very specialized field, and it is not  
13 something that is entered into lightly or easily. There  
14 is a competent body of officials that can give advice  
15 on this and participate in it. My concern, and you  
16 will find it in the records and in the documents that  
17 have been produced by the E.P.B. and also in my  
18 testimony, I have very serious concern about this  
19 whole question of increased access and its consequences  
20 to wildlife.



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
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Q Maybe it's an argumentative

matter but the thing that concerns me is that for example, when a developer comes to develop a sub-division on the outskirts of Toronto, everybody recognizes that that sub-division should have a park attached to it. But none of the other taxpayers in Toronto will pay for the park, it's not their park and it's just a few people living in the outskirts. So society has developed the strategy of inducing the developer to provide the park. He doesn't say where it's going to go or what it's going to look like; he just provides it. Now it seems to me that game management, if it be regarded as a control device to act as an antedote against access, is perhaps in the same situation. Is there any theory in principle, any reason in principle that occurs to you why a developer should not be required to provide the wherewithal to do game management planning, recognizing that the political arm, not the developer's arm, makes the fundamental policy decisions?

A I would agree with you that I see good sound reasons for having the developer participate in providing the opportunity for game management planning. Yes.

Q Is there any precedent for that as far as you know? Or any other member of the panel know?

A I'm not aware of it, but there may well be and perhaps it could be found. I'll have a look.



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss,  
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Q Well, now, Dr. McTaggart-

Cowan, on page 6210 and following you make a list of  
recommendations designed to reduce impacts on wildlife.  
It's interesting because when one looks at them, almost  
all of them relate to elements that would be central  
to a game management plan.

A Could I have just a moment  
to get your particular reference, sir?

Q Yes.

A One concerns the necessity  
for a refuge at least two miles wide on either side of  
the pipeline right-of-way, etc., yes. That is --

Q Well now, let's take that  
one. That, for example, is one of the things that  
could be inherent in any game management plan.

A Yes sir.

Q And that game management  
recommendation, I take it, is directly related to the  
existence of the pipeline and its corridor.

A Yes sir.

Q It's not dictated by  
anything else but the presence of the pipeline.

A That's right.

Q And I take it that in order  
to determine whether that recommendation is a valid one  
or the extent to which it can be applied, there is the  
necessity for substantial study and data to be accumula-  
ted.

A I don't think there's much





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more research required.

Q Well --

A This is a generalized  
retaliative measure.

Q Well, you see one of the  
difficulties is that as soon as you get beyond the  
general statement, there are questions that arise that  
may require study. For example, is this ban for five  
-- is it five miles -- two miles, is it going to apply  
to construction people or everybody?

A To everybody, sir.

Q Including natives?

A Yes.

Q All right. Is it going to  
be a ban on all forms of hunting and trapping, or only  
some forms?

A All forms of hunting, sir,  
we suggested that further on that resident trappers  
who had been using those traplines for a specified  
period previously would be permitted to continue to  
use those traplines.

Q All right, so that in the  
case of trapping, your proposal includes an exception  
for native people.

A Yes sir.

Q What environmental issue  
is at stake in the stipulation of that exception?

A I think it's more a social  
principle than an environmental principle.



Templeton, Adam, McTaggart-Cowan  
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1  
2 Q Yes, and you're doing there  
3 exactly what a game management planner would do, you're  
4 trying to weigh off an environmental interest against  
5 a social or cultural interest.

6 A Yes sir.

7 Q And you're doing this  
8 because of the presence of the pipeline. This route is  
9 to be on either side of it.

10 A We're not ruling in favor  
11 of the trapper continuing his trapping because of the  
12 presence of the pipeline. If you denied his access to  
13 trap, you would be doing it because of the presence of  
14 the pipeline. In other words, you're retaining his  
15 prior right, despite the intrusion of the pipeline.

16 Q Would this ban on hunting  
17 and certain kinds of trapping apply in pre-construction  
18 work, that is surveying and so on?

19 A As soon as the route is  
20 designated, yes sir.

21 Q All right, and does it  
22 continue throughout the period of the pipeline's  
23 existence, or is it going to be evaluated from time  
24 to time, or what?

25 A My own view is it should  
26 continue throughout the persistence of the pipeline.  
27 I also think it should be parallel to all new roads.  
28 I would prefer to see it parallel to all roads.

29 Q In what way, in your  
30 judgment, if any, will it differ from the five-mile





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refuge that has been stipulated in Alaska, apart from  
the fact that it's two rather than five?

A The -- it wouldn't in terms  
of principle other than size.

Q All right.

A The distance is based on  
experience in the provinces. I'm particularly familiar  
with them in British Columbia, where most hunters nowa-  
days don't move more than half a mile from their auto-  
mobile. The joys of recreational hunting seem to be  
mitigated.

Q That doesn't have to be  
restricted  
/to hunters; that applies to almost everybody.

A That is right, sir, but  
you expect something better from those who aver to  
enjoy recreational hunting in wilderness country and  
so on. I think that the only difference here is that  
they don't move probably 100 yards from their snowmo-  
biles when the snow's on the ground.

Q Have you been able to do  
or have you any views about the effectiveness of this  
refuge in Alaska in meeting the environmental objective  
that obviously dictates it?

A The Alaska project has  
only been going for a matter of a year and a half. It's  
too early to know because the criteria for success is  
the persistence of populations. One of the problems,  
of course, is that there's no experimentation set up  
to find out how successful it is.

Q Would that be desirable



Templeton, Adam, McTaggart-Cowan  
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under the Canadian system?

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A In theory it would. In principle it might be extremely difficult to do, because when you're setting up an experiment, you have to have identical circumstances that are altered in only one feature, the experimental feature, and it may be impossible to set aside areas identical with that exception.

Q Does the mobility of the snowmobile reduce the likelihood that this kind of system is effective? Or do we know anything about any of those things?

A There has been no research done, but the mobility of the snowmobile and the nature of the terrain, I mean if it's relatively easily travelable terrain makes it very much easier for a person bent on killing an animal to find its tracks as it crosses the road and follow it at high speed on the snowmobile, whereas if he was on foot travelling slowly and with the necessity of going a considerable distance, there would be less likelihood of his going in pursuit.

WITNESS WILIMOVSKY: Mr. Scott, if I might add to that question. There have been studies done on the size of patrol districts and ranger districts using both real experience and computer simulations, and one can make an estimate of, given a certain ability such as a snowmobile, how much more area can be covered in a given unit of time. These extrapolations could be applied to this situation that you question.



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Q Dr. Cowan, this isn't entirely

/facetious, but how do you get Dr. Wilimovsky to accept this proposal? He was just saying the other day that he wants as much fishing to be done as possible for environmental reasons.

A They are two different

situations and if you were on parallel, a management plan for fisheries, the acquisition of data on fisheries plans

are very much more difficult because you can't see what you're doing. These animals are hidden in the water, they're not visible as the terrestrial forms; and I'm doing exactly, sir, what you're suggesting. I'm making use of the company's efforts to obtain data so that the government, who has the legal responsibility to do so, can make an optimum use plan for fisheries.

Q Well, fishing is banned,

as I understand it, under the Alaska Refuge, is it not?

A Not totally, there are

some areas that are open.

Q I take it that you would

not want fishing banned under this refuge scheme.

A No, I have stated that

already that I believe that fishing should be an activity available to the pipeline worker, and it should be controlled, monitored, and data obtained from it because for all of the reasons that you have so eloquently stated.





Templeton, Adam, McTaggart-Cowan  
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1 Q Well, then, Dr. McTaggart-  
2 Cowan, do I understand that the refuge area excludes  
3 fishing?

4 WITNESS MCTAGGART-COWAN: That  
5 would be my preference, sir, and my colleague and I  
6 part company, though it is a very minor parting.

7 Q Well, doesn't the whole  
8 discussion here illustrate that the creation of a  
9 project of this type requires, whether it be of fish  
10 or of caribou, extensive knowledge and data and analysis  
11 before a game management plan can be developed?

12 A Yes, sir. But I would  
13 like to supplement that statement by this. I am  
14 reiterating what I said yesterday. A responsible  
15 group, a group in government responsible for management  
16 of a resource has to make its day to day decisions on  
17 the data available as you and I both know, and it  
18 therefore proceeds to make regulations which are  
19 relatively crude when it has only got crude data. It  
20 then proceeds to try and refine these data improving  
21 the regulations as it does so, and also incorporating  
22 the results of its earlier experience. So, I hope you  
23 did not imply in your question that you thought that  
24 the imposition of regulations, the process of beginning  
25 to develop an adequate plan to cope with the new  
26 situations created by any such developments we are  
27 talking about, should await the gathering of a great  
28 deal more data.

29 Q No, I didn't intend to  
30 suggest that at all. I simply intended to suggest what



Templeton, Adam, McTaggart-Cowan  
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1 I take it to be obvious, that good regulations as apart  
2 from regulations, that good regulations depend on  
3 knowledge.

4 A Yes, sir.

5 Q And that --

6 A And that is hard  
7 come by.

8 Q And that what is required  
9 here is the provision of a substantial financial outlay  
10 to get good data and good information on which a  
11 game management plan can be developed.

12 A Yes, sir.

13 Q And that financial  
14 wherewithal has to come from somebody.

15 A Yes, sir.

16 Q The people of southern  
17 Canada or somebody else.

18 A Yes, sir.

19 MR. SCOTT: Mr. Commissioner,  
20 is it a convenient time to have a cup of coffee?

21 THE COMMISSIONER: Yes.

22  
23 (PROCEEDINGS ADJOURNED FOR A FEW MINUTES)  
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Templeton, Adam, McTaggart-Cowan  
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(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. SCOTT: Did you tell me that there was something additional you wanted to say about the proposed cross-delta route?

WITNESS THOMSON: A point that occurred to me, Mr. Scott, was that in the south end of the channel -- I'm sorry, of the delta -- the channels do migrate, and air photo studies of photos taken in the early 1950's and subsequently in 1970's show that some of the channels have migrated as much as 2,000 feet laterally. The question occurred to me then was does this migration of channels also occur in the north end of the delta where the pipeline crossing is proposed? This may well have been looked at, but in my rather cursory look I didn't notice it. Two things come up. First of all, when a channel laterally migrates, the permafrost table does not migrate with it. There is a time lag that may cause problems and secondly, if the possibility of channel stabilization is considered, and this is not a difficult engineering feat, although the getting materials to do so might be, you have downstream consequences. One of these -- and Dr. Bliss might comment on it -- is that if you stabilize a channel, then in time you come to the so-called climax vegetation which as I understand it is predominantly spruce forest which provides rather little food for animals in the delta.

May I come back, Mr. Scott, to a point we were talking about yesterday concerning



Templeton, Adam, McTaggart-Cowan  
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2 timing? The problem of frost penetration and thaw  
3 subsidence is about the square root of time. In other  
4 words, it's a power law, so that thaw consolidation or  
5 heaving problems --

6 THE COMMISSIONER: Excuse me,  
7 Dr. Thomson. I'm sure Mr. Scott understood you but I  
8 didn't. That proposition --

9 MR. SCOTT:  
10 Would you like me to  
11 explain it, Mr. Commissioner?

12 I'll explain it to  
13 you privately, Mr. Marshall.

14 A I'm sorry.

15 Q I think, Dr. Thomson, the  
16 Commissioner wanted you -- didn't understand the  
17 implication perhaps of your remark, "the square root  
18 of time".

19 A I'm sorry, Mr. Commissioner.  
20 We were talking yesterday about the time lag required  
21 for looping.

22 THE COMMISSIONER: Right.

23 A And it was presumed that  
24 five years would be the time element between the end of  
25 construction, or the end of powering up and the start  
26 of looping.

27 Q I'm sorry, I thought it  
28 was construction, the initial construction, then five  
29 years of powering up, then new construction.

30 A Yes.

Q That's a lag of five years



Templeton, Adam, McTaggart-Cowan  
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2 apart from the compressor, the work at the compressor  
3 stations, I think. So that's the assumption on which  
4 I was proceeding.

5 A Yes.

6 Q That gives you a five-  
7 year gap.

8 A Yes. The point I was  
9 making, sir, fits in with that, and that is as I said  
10 the frost penetration or thaw penetration varies as  
11 about the square root of time.

12 Q Would you just stop there  
13 a moment? Frost penetration varies as the square root  
14 of time?

15 A Yes sir. I'll give you  
16 an illustration. If you get X feet of thaw in one  
17 year, to get two X feet of thaw you have to go four  
18 years.

19 Q All right.

20 A The point then is that  
21 the problems that would arise from either thaw consoli-  
22 dation of subsidence along the pipeline or heaving  
23 problems will be readily apparent within that five-  
24 year period, probably within the first three years.  
25 Then of course maintenance is essential.

26 THE COMMISSIONER: Thank you.

27 MR. SCOTT: Q Dr. Adam, did you  
28 have something that you wanted to say about either the  
29 cross-delta or the Fort Simpson route change? I may  
30 have missed you.





Templeton, Adam, McTaggart-Cowan  
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1  
2 WITNESS ADAM: I don't think I  
3 have anything on the cross-delta, just offhand. I really  
4 haven't looked at it. I have taken an initial look at  
5 the Fort Simpson relocation. I might be skeptical but  
6 I really see it somewhat as a justification for  
7 chilling further south. To me chilling is a preventative  
8 measure and as such I would expect it to be avoided  
9 where possible, and to me it was avoided on the original  
10 route. But with -- really based on the testimony of  
11 Zoltai, I think he indicated that there's quite a bit of  
12 excess ice on that relocation and my understanding is that  
13 there isn't as much on the old route; but the only other  
14 thing that I noticed was the extremely steep grade on  
15 the south sloping face coming off the Ebbutt Hills.  
16 Just a very rough calculation from a map indicated that  
17 it's an average of about a 10% grade over 2 1/2 miles  
18 and two problems I see associated with that is the time  
19 between the -- when construction is complete and the  
20 time that you initiate chilling. I can visualize  
21 erosion problems on that and also of course they would  
22 result from drainage.

23 The other point, excuse me,  
24 it's just slipped my mind.

25 Q Well, look, if it comes  
26 to mind you interrupt or set up a rocket or something  
27 and we'll --

28 WITNESS TEMPLETON: Can you wait  
29 just a minute, Mr. Scott?

30 Q You're going to be reminded  
of it, Dr. Adam.



Templeton, Adam, McTaggart-Cowan  
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WITNESS ADAM:

1 A Mr. Templeton has just  
2 indicated to me that I left the impression that we  
3 favoured the old route. I don't think that is necessarily  
4 true. All I am saying is that we are really not in  
5 favour of the Ebbutt Hills, that is, we can visualize  
6 a better route than the Ebbutt Hills.

7 Q Well, now, Dr. Adam,  
8 let me turn to a slightly different matter. When you  
9 gave evidence in chief concerning terrain at 6102 you  
10 said, and I am quoting, that:

11 "We consider the impact of this project on  
12 terrain to be potentially one of the most  
13 significant of all the impacts we have  
14 considered."

15 And in the evidence that followed you dealt largely  
16 with terrain degradation that could result from the  
17 project.

18 Now, I would like to ask  
19 you as I think I asked Arctic Gas and Foothills, if you  
20 wouldn't agree that you are concerned about terrain  
21 disturbance at that level, not really, per se, but  
22 because of its environmental effects and they are  
23 really of four types: one, its effects on water bodies  
24 and aquatic organisms; secondly, its effects on wildlife  
25 habitats; third, its visual or aesthetic effect; and  
26 fourth, the effect on the integrity of the project  
27 itself which may lead to the necessity for repairs or  
28 contingency re-entries. Isn't that what we are really  
29 concerned about when we talk about terrain disturbance?  
30





Templeton, Adam, McTaggart-Cowan  
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1 A Definitely. How I see  
2 is it is that the terrain degradation is a first order  
3 effect and then resulting from that you have either,  
4 or can have drainage problems which result in erosion,  
5 and really, even more basic than that, I see wherever  
6 water is involved, it is one mechanism that can transfer  
7 problems from the right-of-way to downstream concerns.

8 Q Wouldn't you agree that if  
9 matters stopped at the first level effect, we would  
10 have a problem of relatively minor dimensions. It is  
11 the sequential effects, in terms of drainage and  
12 water bodies and wildlife habitats and aesthetics  
13 that create the real problems?

14 A Oh, yes, I certainly  
15 agree with that.

16 Q Well, now, how do you  
17 rank those problems? Where are the serious difficulties?

18 A Well, I think here we  
19 are into interdisciplinary work and this is really  
20 how we approached the problem, is that everyone of all  
21 disciplines was involved, and once you get away from  
22 the first and second and third order effects, I think  
23 that probably there are other people on the Board that  
24 comment on those much better than I can.

25 Q Dr. Bliss, do you have  
26 any comments? Which of the consequent effects is the  
27 important one, or can we make that judgment?

28 WITNESS BLISS: I am not  
29 sure that we can make that judgment. This again becomes  
30



Templeton, Adam, McTaggart-Cowan  
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1 more of a modeling effort with quantitative data, if  
2 you are going to do that properly. I guess about the  
3 only thing that I can add is that we felt from a  
4 vegetation point of view that taking the worst situation  
5 that we would not modify plant communities and therefore  
6 potential, at least land wildlife habitat to any  
7 significant degree, i.e., more than one or two, three  
8 per cent in those situations. Taking the worst situation  
9 of incapability of stabilizing terrain, therefore  
10 blocking drainage, therefore, the modification of  
11 vegetation below that, be it wet land or dry land.  
12 That is not to say that it won't take place, it will,  
13 but that we felt that the loss of those kinds of  
14 plant communities along the route, the percentage  
15 loss was within our acceptable level.

16 Q Doesn't it follow then,  
17 that if those risks are within an acceptable level,  
18 everything hopefully going according to plan, that the  
19 real consequences of terrain damage are either visual  
20 or aesthetic on the one hand, or the risks of re-entry  
21 and repair work on the other.

22 A Frankly, that's as I  
23 see it.

24 Q Does anybody disagree with  
25 that?

26 So that when we come to analyse  
27 what we have heard a lot about, terrain disturbance,  
28 could we all -- could the Board agree that what it comes  
29 down to in the Board's view is the possibility of  
30 visual or aesthetic disturbance or the possibility of



Templeton, Adam, McTaggart-Cowan  
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1 the complicated disturbance that results from the  
2 necessity of re-entry to do repair work. Does anybody  
3 disagree with that?

4 WITNESS MCTAGGART-COWAN: There  
5 might be one other, the introduction of further silt  
6 loads into otherwise clear streams?

7 Q Well, that relates to  
8 water bodies, and I understood it, maybe Dr. Bliss  
9 wasn't speaking for any aquatic people, but I think  
10 the thrust of one observation at least is that if  
11 everything goes according to plan, the risks of that  
12 are acceptable, isn't that the evidence as I have  
13 understood it?

14 What I am concerned about  
15 here is the Board has listed a series of consequences  
16 and that is helpful, but is useful to know which are  
17 the ones that we have to worry about and which are  
18 the ones that we don't, and Dr. Bliss has said for  
19 his discipline that the consequences to vegetation  
20 are within the roughly acceptable parameters if  
21 nothing goes wrong, and therefore, he has agreed with  
22 me that the visual, the aesthetic damage and the  
23 re-entry damage is the one to worry about. Now, I  
24 wonder if that same observation can't be made for  
25 the other disciplines.

26 A Mr. Scott, our atlas  
27 designates potential damage and probable damage and  
28 we list a whole series of red squares for potentially  
29 serious damage, potentially probable damage, and  
30 it seems to me that the difference between the two





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1 in fact, it is the difference between the two is our  
2 concept -- if you like to put it -- of the failure  
3 of everything going right. In other words, the operation  
4 of Murphy's Law.

5 Q Well, one must take  
6 account of what is called a Doom's Day scenario, but  
7 what I am concerned about is Dr. Adam has given evidence  
8 that he considers the impact of this project on  
9 terrain to be potentially one of the most significant  
10 of all the impacts we have considered. Now, he has  
11 told me that that really comes down to four sequential  
12 effects. Now, what I am asking of the disciplines on  
13 the panel, is which of those sequential effects are  
14 the ones that we really have to be concerned about?  
15 I have heard from Dr. Bliss, and I think I understand  
16 his answer. What do the water and wildlife people  
17 have to say?

18 A Speaking for myself,  
19 I think that you have already suggested what is  
20 correct, that the most potentially damaging situation  
21 for wildlife is the continued re-entry necessary  
22 to patch the thing up.

23 Q Dr. Wilimovsky, what  
24 do you say about that?

25 WITNESS WILIMOVSKY: As I  
26 have already indicated in the testimony in the report,  
27 we feel that the overall construction and operation  
28 of the proposed gas pipeline on fishes is likely to  
29 be minor. There's a possibility of short-term  
30 effects and local effects resulting from silt loadings and



Templeton, Adam, McTaggart-Cowan  
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1 if something goes wrong, and you get toxic materials  
2 in, you could have a longer term effect. At one  
3 time I was very concerned about the silt and  
4 turbidity situation and have been more or less reassured  
5 by the documents that were presented by the applicant.  
6 I still think that indiscriminate removal of gravel  
7 from active stream beds must be avoided.  
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Q Well now, Dr. Adam, I'm

sorry, Dr. Bliss, did you want to add something?

WITNESS BLISS: I'm not sure

if this is the appropriate time to bring it up, but the

one other thing related to that mitigating effort then

is that I think it's not clear from the applicant's infor-

mation that we have reviewed that there may be adequate

background research done to show in fact how some very

ice-rich slopes might be reasonably rapidly stabilized.

There may be a bit more work needed in this area

but that does not detract from the fact that providing

that information is available prior to construction

that there really is a problem there on the vegetation

and I personally feel that will not happen, that they

come up with this capability even though it is has not

really been demonstrated at this point.

Q Are you referring, Dr.

Bliss, to the distinction between theoretical responses

to problems and experimental responses?

A That's right.

Q Could I ask you to delay

that just for one moment?

A Sure.

Q Because I'm coming to

that. Dr. Adam, on this subject of terrain disturbance,

do you or does anybody on the panel regard the risk of

visual damage or loss as very high in this project?

Is it significant really when all is said and done?

WITNESS ADAM: Well, here I



Templeton, Adam, McTaggart-Cowan  
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Cross-Exam by Scott

1 think it's somewhat a matter of comparing the significance  
2 of the right-of-way, pipeline right-of-way to what is  
3 existing in the area now, such as seismic lines. Now  
4 if there were no seismic lines, my personal opinion  
5 would be that potentially the right-of-way could have  
6 quite significant aesthetic impact. But when I look out  
7 of an airplane window and see all the seismic lines,  
8 I don't think I'm going to be bothered all that much  
9 more by the pipeline right-of-way. Now that's just my  
10 own personal opinion. Of course in wilderness areas  
11 where there are no seismic lines, then of course my  
12 first comments apply.  
13

14 Q Does anyone disagree with  
15 that as a summary of the visual impact of the project?  
16 Dr. Bliss?

17 WITNESS BLISS: No, I don't  
18 disagree. I just add the addition here that as long as  
19 we're talking about a revegetated line that is in keeping  
20 with northern species, which is what we're talking  
21 about, just as we do in seismic lines, one can  
22 argue that a bit of additional habitat diversity maybe  
23 a very desirable thing both from the standpoint of  
24 native plant species as well as providing a bit more  
25 of that kind of habitat for certain wildlife. I don't  
26 mean to imply that I or anyone else are interested in  
27 seeing excessive numbers of seismic lines or pipelines  
28 in the north. All I'm saying is that this is not  
29 necessarily out of keeping of habitat environmental  
30 diversity.



Templeton, Adam, Mettala,  
Wilimovsky, Craik, Bliss,  
Gourdeau, Thomson  
Cross-Exam by Scott

1

2

Q

I think the

3

Assessment Group made that observation that the pipeline

4

can be said to reduce the invariable monotony of the --

5

I'm sorry, that was the applicant's statement, commented

6

on by the Assessment Group.

7

Well, is there anybody then

8

who disagrees with what Dr. Adam has said about the

9

visual implications of the project?

10

WITNESS GOURDEAU: Well, I

11

think I would like to say something about that. I

12

don't disagree with what Dr. Adam has said about this,

13

our own impressions when we are in the airplanes in

14

the north, we southerners; but I think the aesthetic

15

considerations should apply differently maybe for those

16

who live in the north, and are in constant relation

17

with the surrounding scene. This is possibly quite

18

different. It means that especially in the surrounding

19

of places, villages where the people are living, where

20

there are their recreational areas, where they want

21

to go for<sup>a</sup> ride in skidoos or something else, the

22

aesthetic consideration becomes a very important thing,

23

especially for those who have to live quite an important

24

part of the year in darkness and without flowers in

25

certain places and everything. The aesthetic values

26

expressed in the arrangement of soil, wildlife, every-

27

thing, I think is a very important component.

28

Q Dr. Thomson, did you --

29

WITNESS THOMSON: I just want

30

to add to what Dr. Adam said, and that is concerning





Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss,  
Gourdeau, Thomson  
Cross-Exam by Scott

1  
2 the thaw subsidence on the right-of-way as being perhaps  
3 of relatively little environmental consequence, if  
4 that's where it stays. I would just point out that  
5 this should not be construed in any way as an excuse  
6 for allowing these to occur in the first place, if  
7 preventive measures will prevent them.

8 Q Well, I note that point,  
9 but in the evidence at page 6118 the witness refers to  
10 irretrievable aesthetic losses for times to be reckoned  
11 in centuries, and I wonder if that's really what we're  
12 talking about here, or if we are talking about a modest  
13 -- leaving aside Dr. Gourdeau's point, which I think  
14 becomes how do you judge aesthetic loss, and making the  
15 judgment for yourselves and not for anybody else, do  
16 you perceive that the aesthetic question should really  
17 be expressed in those terms, or is it one of very  
18 modest proportions?

19 WITNESS GOURDEAU: Can I say  
20 a word about this? This is a big huge project in the  
21 north, in the Canadian north, and the rules and the  
22 terms and conditions that will be established for this  
23 project will probably be followed in other projects.  
24 It will establish some patterns, especially for what  
25 concerns our preoccupations, and if just because there  
26 is a small impact with a certain project on the aesthet-  
27 ics, generally speaking, from the point of view of the  
28 southerners coming here, or from the point of view of  
29 those who live here, I think it could have very important  
30 consequences in the future because we are established



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss,  
Gourdeau, Thomson  
CrossExam by Scott

-- we are establishing the pattern of development and well, it's why aesthetics should not be treated as not important just because of the fact that with this project itself there would be only certain level of impact.

WITNESS McTAGGART-COWAN: Mr. Scott, if I may, I would like to refer to the differences between different areas. The North Slope of the Yukon would be more subject, in my view, to aesthetic damage than would the interior route. So I hesitate to reintroduce the argument about which route.

THE COMMISSIONER: Why do you say that? I thought that on the tundra there would be no disturbance, of a visual sort, once the pipeline was in place.

A I think the pipeline will probably take longer to revegetate and it will be the first step in a whole series of events.

Q Oh yes, well leaving that aside. You say that the --

A And there are relatively fewer seismic lines out there. I understand there are some. I haven't flown the whole area myself. So that the contrast effect that Dr. Adam referred to will be relevant.

Q Yes. You say that the right-of-way which has been -- the right-of-way will take that much longer to revegetate and that will be visible even though you're speaking not of forest or even the transitional zone between forest and tundra.





Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1  
2 You're speaking simply of tundra when you're on the  
3 coast.

4 A You, sir, I'm sure have  
5 seen the Prudhoe Bay area.

6 Q Yes.

7 A And you've witnessed the  
8 fact that even these highly sophistocated low load  
9 vehicles, rologons, make a very visible impact on the  
10 tundra in as <sup>little as</sup> one passage, an impact which is visible  
11 for years if one's talking about the aesthetics as seen  
12 from the air. In the case of the rologon, it's less  
13 visible from the ground than it is from the air.

14 Q Do you agree, Dr.  
15 Bliss, with this?

16 WITNESS BLISS: Mr. Commissioner,  
17 I'd sooner not open up an area that I think we don't  
18 have sufficient information to properly evaluate. I don't  
19 personally think it's quite that bad. I don't think  
20 the data show it, but let's not --

21 Q No, I mean forgetting  
22 about the rologon at Prudhoe Bay, the difference between  
23 the aesthetic changes on the coastal route and the  
24 interior route, that's what I meant.

25 A I am sorry.  
26  
27  
28  
29  
30



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1 Q I don't want to see you  
2 gentlemen arguing about a hypothetical rologon at  
3 Prudhoe Bay.

4 A Well, I suppose in my  
5 own mind I view this in the sense of yes, the  
6 western portion -- I am sorry, the eastern portion of  
7 the Interior Route has already had modification but  
8 much of the valley systems and the area down the  
9 Canning have had very, very little past or present  
10 modification, so I guess that maybe I would take  
11 the reverse position there that in total, the aesthetic  
12 modification would be a greater amount simply because  
13 there is more totally undisturbed at the present, but  
14 this is out of context with all the rest of these things  
15 and I would sooner not treat these as point by point,  
16 although I recognize the very fundamental importance  
17 of aesthetics and land surface modification and I agree  
18 completely with Eric Gourdeau that we have one  
19 set of perspective and tools of evaluating these  
20 things and native people view this in a totally  
21 different manner.

22 Q That's right, and we are  
23 inclined to think of the aesthetics from the air.

24 A Precisely.

25 Q And if you have been  
26 to either Prudhoe Bay, or say to the site of the  
27 Mackenzie Valley Highway construction, you can see  
28 what an alteration in terms of visual aesthetics that  
29 must present to people who live in the vicinity.

30 Well, I -- yes.



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1 WITNESS WILIMOVSKY: Well, I  
2 would like to again point out the fundamental difference  
3 between the terrestrial environment and the aquatic in  
4 relation to the quotation that you made a few moments  
5 ago. Water courses are very dynamic and in a geological  
6 sense even lakes are ephemeral bodies in the north  
7 and elsewhere and stream channels, beds, banks, are  
8 constantly changing and the criteria that one uses in  
9 making an aesthetic judgment of a stream are somewhat  
10 different than those used for a terrestrial environment.  
11 The repair rates vary according to stream flow and  
12 things of this sort. I certainly would not like to  
13 see an incorrect stream crossing result in massive  
14 bank erosion, but for the record I am trying to point  
15 out the aesthetic judgments again on water are different  
16 than they are with land. Of course, the whole thing  
17 must be taken in context, but streams and lakes are  
18 active dynamic things. They don't stay there forever.

19 WITNESS TEMPLETON: I don't  
20 think that anybody commented on the phrase about the  
21 time and I didn't want to leave the impression that  
22 it had been casually been put in there and I remember  
23 well the --

24 MR. SCOTT: That is the  
25 expression the irretrievable aesthetic losses for  
26 times to be reckoned in centuries,--

27 A Yes, and that wasn't a  
28 casual statement. I can remember Dr. Britton who has  
29 spent many years in Alaska and argued -- he is a  
30 reknowned ecologist and sometimes critical of us





Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1 engineers, trying to say that no one could stop  
2 some of those actions that had been started, and this  
3 is true, if you can't prevent -- when a slide, for  
4 example starts, and it can't be stopped so that the  
5 erosion of the material that is thawing is stopped,  
6 in other words, the slope is long enough so that it  
7 keeps going, there is no immediate way of stopping  
8 this without causing more damage, so those slides have  
9 gone on for many years and will continue to go on.  
10 A lot of them are natural, but some of them are  
11 certainly going to be caused by the pipeline construction.

12 Q Now, gentlemen, this  
13 brings me to the whole question of wilderness and I  
14 note in your report in page three, that in dealing with  
15 it, that is, the assessment, you say:

16 "In accepting environmental change at any  
17 scale in some areas, the Board urges total  
18 preservation of others of like type or quality  
19 and in quantities sufficient to assure the  
20 continuity of ecosystems characteristic  
21 of the North. "

22 Now, that, to me, seems to contemplate some kind of  
23 swap when a piece of land or an ecosystem is taken  
24 out of its natural state for development purposes, there  
25 should be a kind of swap that ensures that a comparable  
26 piece of land or ecosystem will be preserved. Is that  
27 what the Board is talking about? Have I got that right?

28 WITNESS MCTAGGART-COWAN: Some-  
29 body transferred the microphone in front of me which  
30 I suppose indicates from the chairman that I am supposed



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1 to reply.

2  
3 In general terms, I think  
4 that your interpretation is accurate, but I hesitate in  
5 acknowledging it because the interpretation could  
6 go further to be argued then, well, anything that we  
7 want we can get so far as we are prepared to swap for  
8 it, and that is not the intent.

9 Q But that is the least  
10 price you would have to pay?

11 A Now I am not understanding  
12 you.

13 Q All right, well, let me  
14 move on to page number seven when you ask at the top  
15 of the page a question which I think is in the minds  
16 of everybody related to wilderness, what will be the  
17 impact on the limited supply of land in its natural  
18 state, and I read that question to mean if this project  
19 goes ahead, what will be the impact on wilderness  
20 generally understood; and then the answer, I don't  
21 suppose we can phrase every question and expect  
22 an answer, but the answer, and I refer to the last  
23 paragraph:

24 "What is needed now is a new attitude towards  
25 development. We must cultivate the attitude  
26 that it is necessary to weigh the need for  
27 preserving environments in their natural  
28 state for future generations when considering  
29 developments of only immediate benefit."

30 Well, now, leaving aside that educational objective,  
what recommendations, if any, does the Board have with





Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1 respect to the wilderness concept and its preservation  
2 in this territory? What are your recommendations on  
3 this subject?  
4

5 Should we have a swap, are  
6 there other lands that we should require to be set  
7 aside as wilderness lands because the pipeline  
8 has taken these lands? What kind of other things should  
9 be done? Is wilderness at stake because of this  
10 project? What are the Board's views? Dr. Bliss?

11 WITNESS BLISS: I am not  
12 necessarily speaking the Board's views, but personal  
13 views at this point which I am sure would be shared by  
14 my colleagues, at least I hope they would.

15 I think if we look at the  
16 total biology of this northern area and the impact, the  
17 potential impact of pipeline, that the most serious  
18 areas of concern of you people, the people in general,  
19 in fact of ourselves, are with those components that  
20 we have the strongest attachment and feeling for and  
21 those clearly lie in the area of caribou, of muskrats,  
22 of waterfowl, in terms of as we perceive it. Those  
23 things can get mucked up. They are not only depended  
24 on, or people are dependent on in terms of a resource,  
25 but also because of the fact that they are an important  
26 component of these northern systems, so that in answering  
27 this I think that the most important thing is maintaining  
28 the integrity of habitat areas to maintain the  
29 integrity of these populations. Therefore, if a  
30 pipeline goes through, whether it goes through the  
Interior Route or the coastal Route, it is a matter of



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Courdeau, Thomson  
Cross-Exam by Scott

mitigating measures here to ensure specifically with  
caribou, that that population can be maintained. There-  
fore, one of the keys to this is making sure that as  
much if not all of the total land area for that  
population is held for the functioning of that population.  
This, then, carries with it the need, the connotation  
of setting up a wildlife range or wilderness area  
for them as well as the other organisms.



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1  
2 Q Well, before Dr. Wilimovsky  
3 comes in, can I just try and zero the question down a  
4 little bit? You deal on page 3 with the necessity for  
5 some kind of swap when you trade a wilderness area to  
6 development. Now, the area to a certain extent, depending  
7 on how you view it, is being traded here runs all the  
8 way from the Alberta border to Alaska, the Alaskan  
9 border up the valley and along the Arctic coast and  
10 through the delta. Now, a range of ecosystems, some  
11 perhaps unusual, some perhaps more common. What does the  
12 Board say we should trade for that in terms of what it  
13 says on page 3? What should be preserved if that is to  
14 be sacrificed?

15 A If not the  
16 total, the bulk of that total North Slope in a wildlife  
17 range or reserve that is held.

18 THE COMMISSIONER: Well, could  
19 I interrupt for a minute, Mr. Scott? Let me just  
20 remind the Board that in the guidelines, expanded  
21 guidelines for northern pipelines, guideline No. 4  
22 reads -- and Dr. Peterson, who headed the environmental  
23 social program for the Committee on Northern Pipelines  
24 or whatever it is, anyway the fourth guideline reads:

25 "In relation to the pipeline corridors, and  
26 that is the corridor from Alaska to the delta  
27 and the corridor from the delta south, the  
28 government (Government of Canada) will identify ..."  
29 now none of this occurred, but the intent appears to  
30 be there still.





Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1  
2 "...the government will identify geographic  
3 areas of specific environmental and social  
4 concern or sensitivity, areas in which the  
5 government will impose specific restrictions  
6 concerning route or pipeline activities and  
7 possibly areas excluded from pipeline con-  
8 struction. These concerns and restrictions  
9 will pertain to fishing, hunting, and trapping  
10 areas, potential recreation areas, ecologically  
11 sensitive areas, hazardous terrain conditions,  
12 construction material sources and other similar  
13 matters. Statements announcing the above will  
14 be released through the office of the Director,  
15 Environmental Social Program, Northern Pipelines."

16 That's Dr. Peterson, and none of those geographic areas  
17 with specific environmental and social concerns or  
18 sensitivity were ever identified neither to exclude  
19 pipeline construction from them or to impose specific  
20 restrictions on pipeline construction within them. But  
21 there was an intent that seems to parallel your own,  
22 and Dr. Peterson then said, he said if I can just find  
23 it before we go on here, he said:

24 "One of the environmental social program reports  
25 -- this is the introduction to the regional  
26 analysis open file E.S.P. No. 106 -- said it  
27 is possible that Mr. Justice Berger's Inquiry  
28 will identify further geographic areas of  
29 specific environmental and social concerns  
30 and sensitivity."



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

Now the guidelines are a government document, and the  
E.S.P. reports are not necessarily government policy.

Then Dr. Peterson was asked,

"Can you describe the areas that have been  
identified under guideline 4, or which you  
think should be considered to fulfill this  
guideline?"

And I don't know whether you've read all this, and he  
said that:

"These are examples of areas that should be  
considered for special restrictions if out-  
right avoidance of pipeline construction and  
related activities is possible."

He listed them there and then in one of them -- there  
are many but -- well, he said:

"The mapped area of very important wildlife  
habitat for beaver, muskrat and moose and  
waterfowl along Kakisa River west of Tathlina  
Lake,"

then he said,

"Areas mapped as highly sensitive to disturbance  
on the aquatic sensitivity maps, part of the Hare  
Indian River mouth to a point about 15 miles east  
of the Mackenzie, segments of the Willowlake River,  
Trail River, Harris River, Jean Marie River, Trout  
River, Great Bear River and Old Crow River, then  
stream systems including the delta of the Mackenzie  
River, Big Fish River, Rat River, Trout River,  
Jean Marie Creek, Peel River, the mouth of the





Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

Arctic Red River,"

and some more, as well as the Great Bear River, and  
then he said:

"Examples of areas that in my opinion should  
be considered for outright avoidance by pipeline  
construction would be the proposed Dolomite  
Lake-Campbell Lake I.B.P. ecological site, any  
areas proposed as national landmarks such as  
Bear Rock,"

and he goes on. It's fairly lengthy. Now, I don't want  
to read all of that because you may have seen it your-  
selves, but he had gone to great lengths to fulfill that  
-- what is said in guideline 4. Guideline 4, however,  
does not appear to use the expression, "wilderness".  
It uses "environmental" which I suppose encompasses  
wilderness. I'll just return to that for a moment.

"Geographic areas of specific environmental  
concern and sensitivity."

Well, I suppose that would include wilderness areas.  
I'm sorry to throw this thing into the discussion, but  
this guideline No. 4 is in the pipeline guidelines,  
which are incorporated within my terms of reference. If  
the government has not identified those areas it may  
be that the Inquiry would be obliged to consider iden-  
tifying some of them.

MR. SCOTT: Well, Mr. Commiss-  
ioner, it's almost time for lunch, and just like last  
night, can I see if I can't fully occupy with the  
portions you have read, the panel over their lunch hour



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1  
2 so there will be no time for idle or frivolous chatter  
3 among them, they can apply themselves to -- as they have  
4 been -- to helping us. What Dr. Peterson's evidence  
5 referred to and what the report has directly referred  
6 to in its quotation on page 3 is that when you trade a  
7 piece of land to development, you should in some, if not  
8 all cases, get a wilderness trade-back. There should be  
9 land set aside in the appropriate quantities to ensure  
10 the continuity of ecosystems characteristic of the north.

11 THE COMMISSIONER: Well, excuse  
12 me, I still don't understand this, because what Dr.  
13 Peterson said was at the very outset, in conformity with  
14 guideline No. 4, you should set aside these areas,  
15 exclude pipeline construction from them, or impose  
16 severe limits.

17 MR. SCOTT: Well,  
18 that is what Dr. Peterson said. That was his view.

19 THE COMMISSIONER: Yes, I know.  
20 Now, you're attributing to Mr. Templeton a theory  
21 whereby if you turn over let us say the North Slope to  
22 gas pipeline construction, you insist that you get  
23 Baffin Island in return.

24 MR. SCOTT: Well, I've read the  
25 quotation.

26 "In accepting environmental change at any scale  
27 in some areas,"  
28 in accepting that, and the Board has accepted it in  
29 respect of this application on conditions,

30 "the Board urges total preservation of others



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
CrossExam by Scott

of like type or quality, and in quantity  
sufficient to ensure the continuity of  
ecosystems characteristic of the north."

Now whether the Board was attempting to say the guideline is a good one or a bad one, is really irrelevant to my question, which is fundamentally this: Let us assume that the project on the prime route goes ahead, and that therefore we are obliged to accept whatever environmental change for the prime route and the north is inherent in that. Let us also assume that the project will be built according to the best and soundest specifications, in other words that Arctic Gas can do it, or Foothills can do it with the minimum consequences that they predict. All right, we're now at the bargaining table. What are the tradeoffs we should be asking for in line with what you say in paragraph 3, on page 3? Is it possible to say, "We have traded the delta by exposing a portion of it to pipeline construction; we should therefore get in exchange something." Or is this just a kind of pejorative exaltant cry to politicians to be on guard, or does it mean something? If it means something, what does it mean so we can do it? That's what I'm really after.





Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

WITNESS MCTAGGART-COWAN:

A Mr. Commissioner, Mr. Scott,

it certainly means something, and by bringing it to the fore you have made probably the most eloquent reaffirmation of what I said yesterday that could have been made. There is no possible trade off for the North Slope in Canada.

Now, I would like to identify one or two other things. The term "wilderness area" is a land use term. It is not a descriptive term of land that has not been put to other use. In other words it is a land use term just as a national park is a land use term. It is a special area with certain qualities that is set aside for what is now recognized internationally as wilderness.

Q Dr. McTaggart-Cowan, could I just interrupt you for a moment, because you said, if I correctly understood you, that there could be no trade off for the North Shore, but yet you are part of a Board that has approved that route subject to conditions, and having approved it, you having approved it, what I am really asking you and the other members of the panel, is assuming it can be built as Arctic Gas says it can, what are the trade offs, what are the advantages that the public should expect by virtue of the fact that you and the rest of us have conceded that this should be built?

A I am sorry, sir, we have not conceded that it should be built.

Q Well, you have approved it subject to conditions.



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1                   A     Subject to conditions  
2 we have said that we think that it is possible to  
3 build it. Now, the point at issue is the question  
4 of what we have in mind with regard to wilderness or  
5 wild land in its natural state.

6                   Now, there has been some  
7 very interesting recent studies of areas of wild land  
8 set aside for the preservation of assemblages of  
9 plants and animals, and it is quite clearly shown that  
10 there is a gradual loss of the original species in  
11 almost all of these areas that have been studied  
12 for any length of time. The ones that go first are  
13 the rare ones, and the ones at the peak of ecological  
14 pyramid, that is, the things like wolves and grizzly  
15 bears which require a very large area in order to  
16 maintain their populations.

17                   It is this kind of consideration  
18 that led another group of which I am a member to  
19 recommend the creation of the Canadian Arctic Wildlife  
20 Range, because that area is large enough, to maintain,  
21 in our view, populations of grizzlies and wolves and  
22 the Porcupine herd of caribou which is the major  
23 influent animal of the whole thing. It is the animal  
24 that ties together that northern biome.

25                   THE COMMISSIONER: Yes, what  
26 did you call it? The major what animal?

27                   A     The major influent.  
28 I.N.F.L.U.E.N.T. It is an ecological term which  
29 refers to the animal that has the most influence on  
30 what happens within the system.





Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1 MR. SCOTT: Now, what is that  
2 -- is that wildlife range going to cover the pipeline  
3 route?

4 A It would include the  
5 pipeline route along the prime route.

6 Q In other words, it is  
7 going to have one pipeline going through it but not  
8 any more?

9 A If the prime route  
10 was chosen it would have that route, and again subject  
11 to all the caveats, if's, and's and but's, it would  
12 get the rest of the subsequent changes.

13 As I explained earlier, the  
14 choice between the routes is an extremely difficult  
15 one. To me it is like being asked whether I want  
16 to sell my son or my daughter into slavery.

17 Q Well, I suppose if you  
18 were asked to make a report on that you would conclude  
19 that neither of them should be sold and would so  
20 recommend.

21 A Yes, sir.

22 Q You wouldn't recommend  
23 that one should be sold on appropriate conditions?

24 A That is right.

25 Q All right, don't let  
26 me interrupt you.

27 (LAUGHTER)

28 A You will probably be  
29 wanting to for energetic reasons --

30 MR. SCOTT: I think that



1 it is 12:15, Mr. Commissioner.

2 THE COMMISSIONER: Yes, the  
3 Board is on the evening plane, I suppose. Well, there  
4 isn't an afternoon plane, is there ?

5 A Well, perhaps one final  
6 word. The quoted section on page three was, I think  
7 conceived to apply largely to areas about the size  
8 of an I.B.P. site so that if it was necessary to  
9 go through one of these we felt that the area should  
10 be re-surveyed to see whether there was any way of  
11 substituting within that protected area an equivalent  
12 area.

13 THE COMMISSIONER: Well, I  
14 can follow that. An I.B.P. site is a quite different  
15 proposition from the North Slope or the proposed  
16 wildlife range.

17 A Oh, yes.

18 THE COMMISSIONER: You said  
19 that there is no possible trade off for the North  
20 Slope in Canada, no --

21 A I probably should have  
22 made that mainland Canada because I am not familiar  
23 enough with the islands to know whether there is there.

24 THE COMMISSIONER: Dr. Lent  
25 from Alaska was here last month, I think that he is  
26 back again, well, he is back again, but he said that  
27 in Alaska, given present land use commitments and  
28 so on and so forth, there was no comparable area  
29 available to the North Slope in Alaska, it all being  
30 the same geographical area with the same attributes and



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1 in both countries occupied by the same herd, so that  
2 you can take, presumably, if we can take his word for  
3 it, and no doubt we can, there is no possible tradeoff  
4 in Alaska either, so he seems to add force to  
5 what you have said.

6 Well, we had better adjourn  
7 then until two o'clock.

8  
9 (PROCEEDINGS ADJOURNED UNTIL 2 P.M.)  
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(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

THE COMMISSIONER: We'll come to order again. Once again, my apologies, gentlemen of the panel, for being late.

MR. SCOTT: Q Well, gentlemen, this morning before lunch I tried to set up a kind of a line of enquiry to determine what was meant by this recommendation that is found on page 3 of the Board's report, and to find out what was intended by the more general conclusion on page No. 7 that what we need now is a new attitude toward development. Has anybody else any further contribution to make to my understanding of the nature of those recommendations? Or should we pass onto an area where we can start afresh?

WITNESS TEMPLETON: I have a feeling it would be wise to take the latter, but --

Q Don't give in, Mr. Templeton.

A Your question on the coastal route, you say, "Well, we have a landscape unit that is unique in Canada on the coastal plain and how can you justify a pipeline in that unique landscape unit when you haven't anything to trade off?" I think that's the question, isn't it?

Q That's one of them.

A You mean you have more?

Q Yes.

A Oh. I think the way you have to look at it from a practical sense is how



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big a unit, a landscape unit are you going to take?  
In other words, can you consider only the whole coastal plain as one unit, or can you break it down into something smaller than that? Supposing you were to take a section, say 20 miles wide as a landscape unit extending from the coast to the mountain, you could probably find **after** a few years that this would be -- could be considered land pretty well in its natural state. Now, it's not going to be, but neither is it completely in its natural state at the present time because there are some Dew Line sites on it, and they're on the beach but you can still have between those sites a fairly large area of land in its natural state, so if you're willing to accept that limitation and in a pure sense it probably isn't valid, but I think it's not too unusual to accept that; then I think you can take a pipeline, but you run into that same question all the way through when you don't have a land use plan because every time you go to say this activity is all right, you say, "Well, does it fit the land use plan and are we just adding another and another and another activity onto changing the environment?"

The environment always loses, so you have to pretty well accept the idea that there has to be a land use plan, and certain areas set aside and say, "There isn't going to be any more activity in that area." Perhaps not any activity, but you have to specify what kind of activity you can accept in each of the areas set aside in the plan.





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Q Well, I understand then  
that if this swap be understood in terms of units of  
about the dimension of I.B.P. sites, O.K., that's what  
it means. If that's what it means, then let me come  
with the next question. Let us assume that the appli-  
cant is serious about proposing a pipeline along the  
North Coast. You propose in recommendation in chapter 9,  
Volume 4, that the whole issue can be finessed by going  
south to the Porcupine. Is that a serious proposal, or  
is that just a line on a map?



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1 THE COMMISSIONER: That is the  
2 Calef route, isn't it?

3 A That is the Calef route.  
4 Well, I think that it is a serious proposal although  
5 it isn't -- we aren't recommending it because it hasn't  
6 been studied as far as a line on a map--

7 MR. SCOTT: Well, if it hasn't  
8 been studied, Mr. Templeton, how can it be a serious  
9 proposal? It has the virtue of getting us off the map  
10 that we are now concerned with, but do we know whether  
11 there may not be some environmental interest more  
12 critical in that area that you will have just bounced  
13 us into?

14 A Well, we don't know that,  
15 I agree with you.

16 Q All right, well, then,  
17 would you agree with me that it is not a serious  
18 proposal.

19 THE COMMISSIONER: Well,  
20 seriously suggesting we study it, or somebody study  
21 it.

22 MR. SCOTT: Okay. You'd  
23 go this far that you are seriously suggesting that we  
24 study anything that will get us off the North Coast?

25 A Well, I think the  
26 North Coast and also north of the Porcupine .

27 Q All right. Now, in the  
28 event that that doesn't wash and that isn't an alterna-  
29 tive, what recommendations does the Board have, if any,  
30 as to how the North Coast should be developed after the



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1 pipeline is installed and in place? Now, you have  
2 said some general things about what shouldn't be there.  
3 I think you have said that there shouldn't be a  
4 road.

5 A Right.

6 Q And presumably --

7 A -- or an oil pipeline.

8 Q Or an oil pipeline. I  
9 take it -- have you anything to say about whether  
10 looping should be permitted, let us say, in five or  
11 ten years?

12 A I don't think that we  
13 have as a Board discussed looping because it has not  
14 been proposed, I believe. Personally, I would say no,  
15 but I don't think that that is a Board opinion.  
16 I don't accept the idea, automatic looping.

17 Q Has the Board been  
18 able to give any consideration to the kind of restrictions  
19 that should be imposed on development in any wilderness  
20 range that is created through which this pipeline  
21 will go?

22 A What kind of development --

23 Q Well, your recommendation  
24 in chapter 9 contemplates a situation in which the  
25 pipeline may go along the North Coast notwithstanding  
26 your intentions. You then go on to contemplate that  
27 notwithstanding that the North Coast should continue  
28 to be preserved as a wilderness area.

29 A Yes.

30 Q -- and you then stipulate





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1 in very general terms that there should be no roadway  
2 and no oil pipeline and so on.

3  
4 First of all, have you  
5 given any consideration to the dimensions of the  
6 wilderness area, that is question one; and question  
7 two, have you given any considerations to the way  
8 the wilderness area should be run so as to prevent  
9 or channel or restrict development in appropriate  
10 ways?

11 A Well, there was the  
12 Canadian -- I have forgotten the name of it -- Canadian  
13 Arctic Wildlife Range -- is that right, Ian? -- proposal  
14 which went to the coast, which went as far as the  
15 coast from the Porcupine to the coast and it worked out  
16 what sort of uses it could be put, and for example, I  
17 don't think that there was ever any intention that  
18 it would exclude the native peoples from using it  
19 the way they always have used it, and there are some  
20 other uses that are not going to change it particularly,  
21 it doesn't mean that you can't go in there. It means  
22 that there can't be indiscriminate use by, in particular,  
23 machinery.

24 Q Well, to come directly  
25 to it, does the Board accept the recommendations that  
26 were passed at the International Wildlife Range  
27 Conference in 1970?

28 A In general, yes. I am  
29 not sure of every one, but we did discuss it and we  
30 are in general agreement, yes.

Q And those contemplate



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1 limited development?

2 A Yes.

3 Q And you accept  
4 the kind of concept that they were directing themselves  
5 to --

6 A Yes.

7 Q -- for the Arctic north  
8 coast?

9 A Yes.

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1  
2 Q Now apart from the northern  
3 Yukon coast, are there other areas along the pipeline  
4 route, or adjacent to it, that in the Board's view  
5 require the same kind or generally the same kind of  
6 treatment because of wilderness factors or particular  
7 environmental features?

8 A Well, the interior route  
9 goes through the same range, north of the Porcupine.

10 Q Yes, I meant to include  
11 that as having been dealt with. Apart from the interior  
12 and Arctic coast route, are there other parts of the  
13 route that in the Board's opinion require this kind or  
14 analogous kind of treatment?

15 A I don't think we have  
16 studied it that way. I think in the part on recreation  
17 in Volume 4 we made some recommendations but I don't  
18 think we studied any other very unique features similar  
19 to the North Coast.

20 Q Well, for example, at the  
21 end of chapter 9 of Volume 4, the Board says -- and I  
22 quote:

23 "Special attention should be paid to the  
24 requirement for undisturbed natural areas  
25 in the vicinity of northern communities to  
26 ensure that northern peoples are able to  
27 enjoy some of their traditional activities  
28 and escape from the inevitable pressures  
29 induced by the influx of many southern workers."

30 That's the end of the quotation. Now, apart from that



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1  
2 general sort of recreational principle, did the Board  
3 give consideration or is it able to give us any help  
4 in isolating those areas?

5 A No, because those are  
6 I think, as Dr. McTaggart-Cowan this morning mentioned,  
7 when we were talking about a land use plan, that there  
8 should be set aside certain areas that the natives use,  
9 or all the people in those communities, and that that  
10 would be incorporated in the land use plan. But I  
11 don't think we're qualified or we certainly don't have  
12 enough information to be able to draw a line on the map  
13 and say, "This is the recreational or other use area  
14 of those people."

15 Now we have tried to recently  
16 obtain where their trapping areas are, because I think  
17 this too is a land use, and has to be recognized. So  
18 the recreational part would depend on every community  
19 and we were not able to do that.

20 Q Well now, in the same  
21 section you do make some specific recommendations. Let  
22 me read:

23 "Separation of stream crossings by pipeline  
24 and highway should be increased to at least  
25 half a mile edge to edge of the right-of-way  
26 for the Mackenzie River to Camsell Bend, Willow-  
27 lake River, Big Smith Creek, Hanna River,  
28 Thunder River, Tieda River, Canyon Creek,  
29 Francis Creek, Prohibition Creek, Helava  
30 Creek, Christina Creek, for the purposes of



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1  
2 protecting potential truck and auto campsites.

3 All compressor stations and their facilities  
4 should be relocated to points at least out of  
5 sight of Rat River, Vermilion Creek, River  
6 Between Two Mountains, and Thunder River."

7 What I'm really asking is how seriously were these re-  
8 locations looked at by the Board?

9 A The Board didn't feel that  
10 it should go into those in that detail, Mr. Isaac,  
11 this was his recommendation having studied it, and the  
12 Board felt that it wouldn't go for every single recommen-  
13 dation because there may be other -- he was talking from  
14 a recreation point of view and there are other, the same  
15 as all of the research reports in Volume 4 are based  
16 on that discipline.

17 Q Well, it would be a mistake  
18 then for me to conclude that those specific recommenda-  
19 tions carry with it the weight of the Board.

20 A That's right. I think  
21 we're in general concurrence. The Board reviewed all  
22 of these reports and if they weren't of the quality and  
23 in general conclusion, they didn't publish it but the  
24 report is signed by the author and it's his report.

25 Q Well now, Mr. Templeton,  
26 I asked you to review yourself and with the relative  
27 members of the Board the answers that Mr. Hemstock gave  
28 to a series of questions about potential effects of  
29 pipeline developmen t on wilderness values that I  
30 posed to him in Volume 99, pages 15052 to 15055, and I





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1  
2 wonder if I could ask if the Board has -- differs in  
3 any sense from the view that Mr. Hemstock has expressed,  
4 and if so, in what way?

5 A I think we spent the lunch  
6 hour on the wrong question, Mr. Scott. Could you give  
7 me that?

8 Q Dr. Fyles, I think, provi-  
9 ded you with a copy of the excerpts.

10 A Oh, yes.

11 Q Page 15052, now what we  
12 did there is we asked Mr. Hemstock for Arctic Gas a  
13 series of questions about impact and potential impact  
14 on wilderness values, and he gave a series of answers,  
15 and what I'd like to know is whether the Board disagrees  
16 with that approach or that view.

17 A Well, I'm afraid that  
18 I'm at fault, Mr. Scott, for not having given this to  
19 the Board, though I can give you mine but I don't  
20 think --

21 Q Well, perhaps you can let  
22 me know. Would that be all right, Mr. Templeton?  
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1                   A     I think we stayed away  
2 from the word, "wilderness." You will note in our  
3 report we called it land in its natural state because  
4 wilderness has different meanings to different people  
5 and so I may try to define that a little.

6                   Q     I don't want to miss  
7 any nugget of information. What did you spend your  
8 lunch hour on?

9                   A     There are certain  
10 things that lawyers shouldn't know about.

11 (LAUGHTER)

12                  Q     Well, now, Dr. Bliss  
13 this morning raised a matter that I would like to  
14 come to and would like to ask each of the -- or  
15 ask any member of the Board or staff on the panel  
16 to comment on, and that is having assessed the  
17 level of environmental work and the type of environmental  
18 work that has been done by CAGSL over many years and  
19 which is now being done by Foothills as well, are  
20 you able to tell us in a general or particular way  
21 what, in your view, is required by way of further  
22 research to enable the applicant and the public  
23 to better predict and thus assess the environmental  
24 impacts? Dr. Bliss, as you raised the question in a  
25 slightly different form, perhaps you could start off.

26                  WITNESS BLISS: Mr. Scott,  
27 in terms of the biological things, sometimes it is  
28 far easier to hone in on this with regard to plants than  
29 it is animals, in the sense that plants hold still and  
30 you can manipulate them or not manipulate them and see



Having said that and coming then basically to the revegetation work, I know that there is some work underway, one year of, in essence, crop failure, lack of success at Tuktoyaktuk, and I gather that this research is in its second year. But the point that has come up in the Inquiry on several occasions: can you strip off the tundra and put back reasonable chunks and get them to grow, which stems from Mr. Dabbs original observations along the seismic line near the Firth River. Clearly I feel that this is an area where we need to have more information than at least I had in hand to assess as to the degree of success of this, so I raise this as a point to be sure that if there is not already adequate research under way that it be so done and worked up in a manner, and that not only the applicant, but others can see that in fact this either is or is not a reasonable mitigating method in revegetation.

Secondly, a point that we raised several years ago and again it may be under way in terms of research but I am not sure, and that is to try to take a worst situation of either a river crossing with high ice content or a side slope with high ice





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1 content, strip it off and attempt to revegetate adding  
2 the factor of erosion and let's see how difficult  
3 it is, because so far again I believe we are talking  
4 mainly in terms of generalities of what it is hoped  
5 will be done or capable of being done, and again I  
6 raise this from the standpoint of not knowing whether  
7 the data are in hand to assess it, at least I have  
8 not seen them and have not been able to, but I feel that  
9 this is of fundamental importance, to tie down those  
10 two areas in terms of revegetation that I still feel  
11 are the most crucial ones.

12 Q And I take it, Dr. Bliss,  
13 that what that essentially requires doing is leaving  
14 aside the theoreticians debate and the drawing  
15 boards for a period of time and going out and performing  
16 some kind of experimental work, either out or in a  
17 laboratory.

18 A Precisely, we have to  
19 simulate in the field, and the real world is in the  
20 field in the north so that you either go to Richard's  
21 Island or some comparable place and do this kind of  
22 experiment.

23 Q Well, now, what do the  
24 other members of the panel have to say with respect  
25 especially to their areas of discipline?

26 WITNESS WILIMOVSKY: I must  
27 respectfully disagree with you, sir, in saying that  
28 going to the drawing board can't provide some  
29 useful information.

30 Q I didn't intend to say



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1 that, I was simply trying to contrast what I observed to  
2 be a distinction in Dr. Bliss's approach.

3 A I haven't finished my  
4 statement, sir.

5 Q All right.

6 A I have many concerns  
7 about the problems that face this Inquiry and I sympathize  
8 with the problems of what are generally called  
9 qualitative or subjective data, and I would suggest  
10 that what I would like to see is the reduction in some  
11 of the areas of uncertainty and if you will hear  
12 me out this has to do with certain principles of  
13 uncertainty in data and they can be refined in the  
14 following way, and it is, if you will, a drawing  
15 board exercise.

16 It is not the same kind of  
17 worst case exercise that we did, and which you, I believe,  
18 referred to earlier as the Doom's Day, and the Doom's  
19 Day is a special kind of worst case in the technical  
20 literature. I would like to see the company look  
21 at the route, the proponents, both proponents, or  
22 however many they may be, look at the route and see and  
23 suggest to us what the consequences would be of a  
24 policy failure. What would be their remedial response  
25 if some decision they had taken didn't work? This  
26 is not like a contingency plan. It is a higher order  
27 thing and it goes far beyond the environment and that  
28 is why the Environmental Protection Board would have  
29 been completely out of order to consider this  
30 kind of an approach. But I think that if the



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1 environmentalists could be furnished with the various  
2 applicants' opinions as to what their decision would  
3 be under conditions of a policy failure, a lot of the  
4 kinds of uncertainty as so beautifully phrased by  
5 yours and your colleagues questions, might be  
6 resolved.





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Q That's one state of

preparedness that you would hope to find from the  
applicants. Are there others, Dr. Wilimovsky?

A No sir.

Q Dr. McTaggart-Cowan?

WITNESS McTAGGART-COWAN: Sir,

I feel I can't answer in detail about the route this  
research should take to improve our predictive possibili-  
ties. I have already indicated in earlier testimony  
certain areas of research, particularly with reference  
to caribou, that I feel would be most helpful; but in  
the extremely complex research fields that are involved  
with the vertebrate animals one would want to do some  
very careful consideration before committing oneself to  
what further should be done to answer the questions that  
have to be answered.

Q Mr. Craik?

WITNESS CRAIK: Well, Mr.

Scott, I think that some comment should be maybe made  
to put into my comparison the effort that has gone into  
the research to date. I don't exactly -- the easiest  
way to do it, of course, is to look at the dollars that  
have been spent in total. The Environment Board work  
has probably, in terms of dollars, not been as large  
as some of the others. I think we are somewhere over  
\$3. million in the total period from 1970 until now,  
and I think the applicant mentioned in testimony that  
theirs was somewhere around 12½, and I'm sure the  
Federal Governm ent 's figures were somewhere near where



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1  
2 the applicant's figures are, and perhaps Foothills had  
3 a budget too that we're not aware of that would add on  
4 top of that. So if you add it all together it would  
5 appear to be somewhere in the order of \$30 million of  
6 expenditures that have gone into so-called environmental  
7 studies over the period of five years to study this one  
8 singular project which is a gas line from the Arctic to  
9 Southern Canada, or just to the 60th Parallel, and if  
10 you compare it with -- if you look for some means of  
11 comparison the thing to do is look to other people's  
12 budgets. I would think that that probably exceeds  
13 about five years of combined wildlife budget, for instance,  
14 of the western provinces, and that is the size of dollar  
15 effort that has gone into generating primarily baseline  
16 data. In the questions that Mr. Ryder asked at some  
17 stage of the evidence, on behalf of the Commission, I  
18 noticed that on two occasions he came back to try and  
19 pin down whether research should not be broken down into  
20 something like three parts -- your baseline work, your  
21 impact evaluation, and thirdly, your mitigative design  
22 measures, and I noticed that he kept coming back to  
23 some of the panel members, I think it was Dr. McCart at  
24 the time, and asking him if that wasn't the way it should  
25 be done.

26 Now, it is the way it should be  
27 done, but the experience that we've had in the work we've  
28 done is that it is very difficult to spot specific  
29 problems where you want to go after a design solution,  
30 particularly in this field of biology. Biological pursuits



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2 don't lend them selves to doing task-oriented, mission-  
3 oriented specific research and type of problem-solving  
4 that many of your technical fields do, and as a result  
5 I think that most of the money spent has generated a  
6 great deal of baseline data and the emphasis has gone  
7 into that primarily to provide a background from which  
8 personal judgments can be made without in many cases  
9 being able to prove in terms of numbers or figures or  
10 that sort of thing, prove the point in that way, but it  
11 has gone into subjective judgments.

12 I have a feeling that if you  
13 spent \$60 million on the research instead of 30, that  
14 you still would have had Dr. Cowan saying like he did  
15 this morning that it was a case of whether he sold his  
16 son or his daughter into slavery. In other words, I  
17 doubt whether another doubling of the budget would have  
18 proved to Dr. Cowan that he would have drawn any diff-  
19 erent conclusion. I certainly don't wish to -- I don't  
20 think I'm putting him on the spot in saying that but --

21 Q He can't be bought.

22 A -- you've heard the  
23 reply. I can assure you that Dr. Cowan couldn't be  
24 bought for \$30 million, he wouldn't change his opinion  
25 in that regard, and I don't think that you would change  
26 the opinions of very many people. I think that your  
27 opinions still are going to be opinions based on person-  
28 al judgments to a much larger degree than they would be  
29 in a straight technical field. I think that's what it's  
30 going to boil down to. It boils down to in many cases





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1  
2 how people feel about things, how the native people feel  
3 about the change to their environment, how the people  
4 who have been involved in the biological fields feel  
5 about the invasion of people and increased populations  
6 and construction activities into their traditional  
7 environment. It boils down to in very, very many  
8 cases subjective opinions.

9 Q It maybe that that's so,  
10 but my question, I think, is a great deal simpler, per-  
11 haps more complex, I don't know, than that. Bearing  
12 in mind that there are, let us say, four or five or  
13 six years between now and the commencement of the  
14 construction of this project, you people are as knowled-  
15 gable as any persons outside of the applicant about  
16 this project because you've been looking at it for sev-  
17 eral years. What do you think the applicant should be  
18 doing between now and then to minimize the risks? Now  
19 it's, you know, everybody says, "Well, they should  
20 be doing more," and "They should be working harder,"  
21 and "They should be spending longer hours," and we can  
22 take all that as given; but as Dr. Bliss says, what  
23 he thinks they should be working on a model problem and  
24 trying to resolve it in the field. Now, what I want to  
25 ask you is, have you any suggestions as to what they  
26 should be doing in the next four or five years? Dr.  
27 Wilimovsky has a suggestion about problem which he  
28 thinks, as I understand it, they should direct themselves.  
29 Has anybody else any?  
30



Templeton, Adam, McTaggart-Cowan  
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1 A Well, I mentioned one  
2 this morning that I felt was important just from the  
3 comment made by the applicants as well as ourselves  
4 so far, and that is to try and assess -- one of the  
5 major considerations in the delta area has been the  
6 impact specifically on bird populations and I think  
7 that probably from the research that has been done  
8 there would appear to be a very substantial area there,  
9 not to do a narrow base study on experiments, but  
10 a longer term study based on actual aircraft traffic  
11 in the area now. That is one and there are perhaps  
12 other specific areas.

13 Now, in terms of the applicant,  
14 the applicant indicated in his testimony to the Commis-  
15 sion, that they are working on a continuous day to day  
16 basis to apply their baseline knowledge to design and  
17 I suppose that one can't question that that is taking  
18 place unless you know that it is not taking place,  
19 but the applicant says that it is.

20 Q Dr. Thomson?

21 WITNESS THOMSON: Mr. Scott,  
22 at the University of Alberta we just recently had a  
23 PhD. thesis turned into us having to deal with slope  
24 stability in the north, and part of this is a  
25 theoretical approach having to deal with the influence  
26 of warmer temperatures on thawing faces and so on, but  
27 the second part has to deal with stability measures  
28 that would be applied in the field to stabilize those  
29 particular slides and some of these are very large, and  
30 so far as I know, there has not been any real stability



1 measures used in the field on some of these rather  
2 large slides. Now, it is a difficult subject and a  
3 costly one. Nevertheless it should be attacked, I think.  
4

5 Q Well, I would be grateful  
6 if any -- have any other members of the panel any  
7 comments? Dr. Adam.

8 WITNESS ADAM: Yes, of course  
9 I am dealing mainly with the technical field, so I  
10 think it is much easier, maybe, on the spot, and I think  
11 that I have made these points in general, but certainly  
12 with winter roads, I think that some experimentation  
13 on the North Slope is one area that I would like to  
14 see done between now and the beginning of construction  
15 if that happens. I would be interested in things  
16 like production rates of building winter roads if  
17 snow hauling is necessary, and as I mentioned yesterday,  
18 I would like to see them operationally proven along  
19 a pipeline spread, if that could be arranged between  
20 now and then.

21 As far as frost heave, I would  
22 certainly like to see the continuance of the Calgary  
23 Test Site so that we at least approached the long-  
24 term effects of frost heave resulting from chilling,  
25 of course.

26 Another area is cross-drainage,  
27 especially across the frost bulb. I would like to see  
28 experimentation done on that, also on surface drains.  
29 I agree with Dr. Thomson on the slope stability. That  
30 is another area that could be studied in more detail.

There is only one other comment





Templeton, Adam, McTaggart-Cowan  
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Cross-Exam by Scott

1 that I would like to make, and that is that some  
2 reference was made yesterday to the building of the  
3 pipeline as the ultimate experiment and I think that  
4 personally that is only true if there is somebody  
5 out there at the time taking data, and that brings me  
6 at least to one of the recommendations that the Board  
7 made, and that is a monitoring group, because we are  
8 not going to find anything out about winter roads in  
9 the ultimate experiment unless somebody is out there  
10 taking data and I imagine there are a lot of other  
11 areas where that statement applies.  
12

13 Q Dr. Bliss?

14 WITNESS BLISS: I just wanted  
15 to clarify one point, sir, and that was at the end of  
16 our discussion I may have left you with the impression  
17 that in terms of revegetation they are just at the  
18 drawing board stage and now need to go into the field  
19 because the facts are that better than 30 well sites  
20 have been seeded in the delta, I merely meant in terms  
21 of a slope situation.

22 Q No, I was simply attempting  
23 to contrast your proposal for their future work in  
24 that fasion.

25 Well, now, if anybody else  
26 in the future, not necessarily today, concludes before  
27 this Inquiry is over, that there is something else the  
28 applicant should be doing as they move toward construction  
29 in the terms that we've discussed let us know. It is  
30 all very well to say that the construction of it will be



Templeton, Adam, McTaggart-Cowan  
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1 the ultimate experiment, and it will be, no doubt, but  
2 that would surely be unjustified if there were other  
3 experiments within a reasonable range of cost that  
4 could have been done before it was built. So, if any  
5 members of this Board in the future have recommendations,  
6 I would appreciate receiving them.  
7

8 WITNESS TEMPLETON: Mr. Scott,  
9 there is one that has bothered me for some time, is  
10 the company, the CAGSL company and the Foothills, have  
11 both made quite a number of commitments and the  
12 problem that I have is what are the chances of them  
13 being able to meet those commitments? I am not at  
14 all saying that I don't think that they aren't sincere  
15 in making, but times and people change and they are  
16 very large organizations, and, for example, I think we  
17 discussed with Mr. Horte, was he going to be able to  
18 convince the labour unions that would be working on  
19 the job to abide by the terms and conditions that  
20 come out of this Commission, and he said that he  
21 thought he could. But you know, the same way with  
22 the controlling of aircraft, because this is --

23 THE COMMISSIONER: Mr. Horte  
24 thought he could persuade the labour unions ?

25 A Yes. And the same  
26 with aircraft, is that they are under D.O.T. regulations  
27 and they are doing a great deal of talking about  
28 restricting flights and paths and all this sort of  
29 thing and maybe we can't really achieve it and it would  
30 be interesting to see an analysis by a group to see



1 what are the chances of really accomplishing those  
2 things that they have committed themselves to.

3 THE COMMISSIONER: Well, I  
4 think that that underlies the whole Inquiry in a  
5 sense, that very question, but we do expect that the  
6 trade unions whose members would likely be employed  
7 on the pipeline will be making submissions to this  
8 Inquiry. In fact, members of this Inquiry's staff have  
9 already approached them and told them -- told them --  
10 asked them to let us know what their thoughts are,  
11 their views. They are aware of what is going on in  
12 Alaska and they are no doubt anxious to co-operate  
13 with the Inquiry.

14 A The only thing is that  
15 Mr. Horte has committed on the stand certain things and  
16 I promised him that I would read those commitments to  
17 him at a later date, and I think I did to Mr. Blair,  
18 too, and the labour unions don't have the public  
19 commitment, perhaps, that they do.

20 THE COMMISSIONER: Well, I think  
21 that we will likely receive some expression, certainly,  
22 of their attitudes from labour organizations. We are  
23 anxious to involve them in Phase IV of this Inquiry.  
24 Certainly, Mr. Horte's statements are made in good  
25 faith and even if he may be shooting a little higher  
26 than most of us would in those circumstances.

27 MR. SCOTT: My fear, Mr.  
28 Commissioner, is a slightly different one, and it is that  
29 by failing to ask the right question or by failing to  
30 present it in an attractive or in an appropriate way I





Templeton, Adam, McTaggart-Cowan  
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Cross-Exam by Scott

1 will provoke silence when in fact I should be leading  
2 an experienced and expert witness to develop an appropriate  
3 condition or recommendation for us, and I am conscious  
4 that I want to avoid that and I emphasize, therefore,  
5 if any members of the panel have a contribution that  
6 has not been elicited through somebody's fault or  
7 by accident to the work that lies ahead of the applicant  
8 I would be grateful to have it either in written form  
9 or in any other form that is regarded as convenient.  
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Templeton, Adam, McTaggart-Cowan  
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Gourdeau, Thomson  
Cross-Exam by Scott

1  
2 In order to induce that <sup>a</sup> little bit perhaps I could come  
3 to Dr. Wilimovsky now and ask him a question that arises  
4 out of an exchange he and Mr. Anthony had. Mr. Anthony  
5 yesterday or the day before suggested to you that you  
6 seemed to be slightly different in emphasis from Dr.  
7 McCart's view. Dr. McCart thought that it wasn't necessary  
8 perhaps to establish standards and that they would not  
9 be needed on this particular kind of job, and the evi-  
10 dence reveals that your view was slightly different and  
11 that some standards should be developed, and you gave,  
12 I think, the example of establishing silt levels and  
13 so forth. Now what I'd like to ask you, Dr. Wilimovsky,  
14 is how do you envisage the process by which these  
15 standards will develop as we move toward construction  
16 of this project?

17 WITNESS WILIMOVSKY: You ask  
18 neat questions.

19 Q Eight questions.

20 A Neat.

21 Q Oh,

22 A First of all, I think  
23 and I'm not putting words in Dr. McCart's mouth, he  
24 was going to achieve standardization, if I understood  
25 his testimony, by making sure that he had what he  
26 called a competent biologist at every site. I don't  
27 know if we've got that many around or enough and those  
28 that want to go where they're supposed to be at the right  
29 time, etc.

30 Q We call it the Dr. McCart



Templeton, Adam, McTaggart-Cowan  
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Cross-Exam by Scott

1  
2 doll. You wind him up and you send him to the river  
3 crossing and then the job's done.

4 A In my view, one must  
5 establish standards and I said something about this  
6 before, and we do a lot of work in this area and I don't  
7 want to cast out a lot of verbiage about things that  
8 were already said; but my view goes much beyond this  
9 project and it has to do with the entire concept, the  
10 environmental assessment, the prediction and mitigation.  
11 I think in one sense of the word Mr. Craik's testimony  
12 was getting at this in how much money was spent, and  
13 where are we in terms of the engineer or the public in  
14 giving the answers that they require, and we have to  
15 go through this to give kinds of uncertain positions  
16 that we are in today, according to some people. This  
17 is a serious question and in some areas it's easier to  
18 do than others, and to put this into perspective, if  
19 you want to have a perfect prediction and perfect model  
20 you measure everything for umpteen years, you establish  
21 the variability and you then make your prediction.

22 But there are some things  
23 that we could measure for the rest of our lives and  
24 because of inherent variability and the fact that we  
25 aren't in a stable, permanent situation, the fact that  
26 they vary, we could never measure and come to an accurate  
27 prediction on it, and I could give you examples if  
28 they would be of any use. But in response to your  
29 specific question, there is and has been a great deal  
30 of work done on the response of fishes and other aquatic





Templeton, Adam, McTaggart-Cowan  
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Cross-Exam by Scott

1  
2 organisms to turbidity, silt loads, dissolved oxygens--  
3 dissolved gases, and solids in the water system. We  
4 would start, I would suggest one would start by taking  
5 the available data and trying to apply them to species  
6 counterparts, analogues in the north and set up, if  
7 you will, a graph against, take the trivial example,  
8 silt loadings on one axis and velocity on another  
9 and particle size, you get into a multi-dimensioned  
10 nomogram that it's possible then to say, "O.K., if this  
11 is the current in this river, and this is the silt  
12 loading, and this is this, you have a 50% probability of  
13 killing this kind of fish, or this fish has such and  
14 such a probability to survive over X number of months."

15 Now, initially anyone will be  
16 making mistakes with this kind of prediction because  
17 there's an inherent variability about them, and when  
18 you make a mistake, go back, if you will, to the laboratory  
19 and see what the problem is. It could be that we're  
20 measuring too few things; but if environmental standards  
21 are ever going to be imposed, we're going to have to  
22 come up with dimensional constants perhaps, so that  
23 we can measure a few or many things and compare them  
24 with a single number, like a Reynolds number, if you  
25 will, the hydrologists use.

26 If there were adequate funds  
27 and interest in the problem, I think it is not just a  
28 proponent problem, I really believe that if we in Canada  
29 and the rest of the world believe in environmental  
30 protection there should be concerted effort toward



Templeton, Adam, McTaggart-Cowan  
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Cross-Exam by Scott

1  
2 working on standards, but this work could be parcelled  
3 out. My next remark is not in any way a criticism  
4 because I don't know what some of the federal labs are  
5 doing, but I would suspect that some of the federal  
6 labs should begin looking at some of these parameters  
7 under an experimental basis in the laboratories so as  
8 to set up such standards. I have scanned, I always  
9 use that word, I hope, advisedly, because I can't  
10 remember page by page discussions, but a great deal of  
11 the testimony at this Inquiry has dealt with turbidity  
12 and silt, and a lot of the people that commented on it  
13 were highly expert; but I think only part of the story  
14 has been expressed and again I mean no criticism because  
15 I have been reading out of context. But if you add  
16 a slight or a modest loading to a river or a lake that's  
17 already got a high loading, the probability of damage  
18 is very slight to the aquatic organisms. If you put  
19 in a similar proportional loading to a water body that  
20 has a low loading, the probability of damage is very  
21 much higher. This kind of relationship has not been  
22 coincided. Indeed, one of the important factors is  
23 temperature. I know some lakes in Alaska and streams  
24 where the loadings are so heavy when you put your  
25 hands in the water you can feel the grit, it's impossible  
26 to see a centimeter into the water, and swimming right  
27 through this natural turbid and silty situation are the  
28 most beautiful grayling you could ever see. They run  
29 through this and some of the streams that I have person-  
30 ally observed where they spawn have modest loadings of





Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1  
2 gravel but they live -- of the silt, but they live most  
3 of the time in this turbid situation. So temperature  
4 is a factor.

5 I just think that it's very  
6 dangerous to go along on an imperical ad hoc basis  
7 without trying to quan\_tify these things, both for the  
8 good of the proponent and all future such projects.  
9 The matter of siltation should have one other point  
10 read into the record. Siltation occurs below dams and  
11 in other situations, and in the case of salmon a great  
12 deal of work has been done, and in the Soviet Union an  
13 enormous amount of work has been done on this, and I  
14 would like to say that in many situations -- this is  
15 not a caveat or licence to go out and silt, don't  
16 misunderstand me -- but in many situations you form a  
17 blanket of silt on the gravel interface that is just  
18 a few millimeters thick and that eggs and other  
19 invertebrates below this blanket are fed by an under  
20 interface waterflow, and so the eggs hatch and develop  
21 normally. Now in some situations where you know  
22 the vital nature of the siltation is going to bring  
23 about such a thing, you could be less concerned about  
24 siltation, but without having such baseline information  
25 on the nature of the siltation, the rate of its  
26 oxidation, current flow, and particle size, so you can  
27 do some Stokes law calculations, this kind of thing,  
28 you're in a pretty difficult state.

29 So it is my -- it would be  
30 my desire, if I were in a position of authority in this





Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

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area, to be working in the laboratory and with field  
controlled experiments -- I think I said this three or  
four years ago in a public paper -- to establish standards.



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss,  
Gourdeau, Thomson  
Cross-Exam by Scot

1 Q In point form, Dr.  
2 Wilimovsky, could you tell us, just because I want a  
3 check list, if that is possible, can you tell us  
4 the kind of data that you would want to develop prior  
5 to developing a game management program related to  
6 fishes in the Northwest Territories?

7 A Fish management?

8 Q Yes.

9 A How much time do you  
10 want me to take?

11 Q That is why I suggested --  
12 how much time do you have to develop the fish management  
13 program, is that the question?

14 A No, I just wanted to know  
15 if you wanted me to give you a lecture on fishery  
16 biology.

17 Q No.

18 A I am not being facetious--

19 Q No.

20 A I am not being facetious,  
21 sir -- or if you wanted me to tell you the elements  
22 that go into --

23 Q I would like to have  
24 your judgment as I have had the judgment of other  
25 experts who have given testimony about the requirements  
26 in terms of data for the development of such a program.

27 A Four factors control  
28 the state of the population size: recruits, that is,  
29 the births that enter the population; the growth of  
30 these animals; their natural death; and those that are



Templeton, Adam, McTaggart-Cowan  
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Gourdeau, Thomson  
Cross-Exam by Scott

1 harvested by man.

2                   You must get some measure  
3 of these elements to know the turnover rate of the  
4 population. If you can determine the turnover rate of  
5 the population you can determine and predict what  
6 fishing pressure or harvest pressure may be applied to  
7 that stock without destroying it. One must recall  
8 that never can you harvest a virgin stock and keep  
9 the size composition in its initial state. That is the  
10 reason that whenever fishing starts you always hear the  
11 stories about the good old days of the big ones. It is  
12 biologically impossible to maintain a stock of large,  
13 old big ones and get the greatest production from the  
14 middle of the production curve. You need those  
15 four elements and there are approximations that can  
16 be made for all of these elements. If one sets up a  
17 series of patterns or families of information, not of  
18 fish, families of information, for different species  
19 groups, one may come up with reasonable management  
20 possibilities.

21                   Added and included in this,  
22 it is not in addition, because it is point four, the  
23 harvest rate, if we know nothing else about a population,  
24 but can get some information on harvest rate that's  
25 likely to be imposed on the population, you can make  
26 some intelligent guesses on the state of the stock by  
27 the way that the catch per unit of effort varies with  
28 time, not just what the catch per unit of effort is,  
29 but in what direction and what rate it varies. If you  
30 will think about that, Mr. Scott, that gives you four





Templeton, Adam, McTaggart-Cowan  
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possibilities for management implications.

Q Have you any judgment  
as to what is within the realm of practical possibility  
for the Mackenzie Valley now?

A The whole valley?

Q Yes.

A There are various levels  
of plans and most fisheries planning in Canada, the  
United States and the rest of the world suffers from  
the failure to do overall planning. It would be highly  
desireable to take a first cut estimate at the  
potential yield of the entire Mackenzie Valley. We  
have no such information for any such river system in  
North America, nor indeed in any river system in the  
world. You can do it and it has been done for some  
marine areas, and one or two of the large lakes.  
It involves determining the objective of the plan and  
this is in part the social goal, but I always to remind  
people, and this offends a great many people, that one  
is managing the resource for the sake of man, not for the  
sake of the resource. This isn't quite as bad as it  
sounds on first cut because then you do include in  
that formulation future generations and so forth, but  
remember fundamentally, unless the goal is total  
preservation you're managing-- and even there  
because of one built-in ego, you are managing  
for man's sake, -- people's sake, for the women's  
libbers -- than the animal itself.

This requires that an  
objective goal be established and one therefore -- I would



Templeton, Adam, McTaggart-Cowan  
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Gourdeau, Thomson  
Cross-Exam by Scott

1 have to ask you, should the goal for the Mackenzie  
2 Valley aquatic system be domestic fishery, sport  
3 fishery, commercial fishery, or some combination of  
4 these, and if you want a combination what are the  
5 societal pressures that form this combination? If you  
6 give me that combination I can devise a fishery in-  
7 ventory to provide you with the overall long-range  
8 plan to manage that system and then within that  
9 long-range plan you have short-term management sections  
10 and you look at the plan at regular intervals as you  
11 get more information.  
12

13 Given the none information  
14 if you will, for most situations, your best bet is  
15 to go in and find out how the rate of harvest changes  
16 and get some estimates on population size. I believe  
17 this is in my previous evidence, that I regard it as  
18 environmental insurance for the government, for the  
19 applicants, and for the public to have some of this  
20 information in advance of any modification of the  
21 environment.

22 Q Well, perhaps I am  
23 beginning to panic unduly, but we have been told  
24 that game management plans, a function of government,  
25 are one of the keys to minimizing the impact of this  
26 project. We are also told in other forums about  
27 the great pressures that human resources and people  
28 coming into the Territories may place upon the  
29 wildlife, including the fishes of the Territories. We  
30 are also told that because there have been limited needs



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Criak, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1 up till now, there is no substantial game management  
2 or fishes management plan in existence and we have  
3 obviously got about five years to get one. Now, what  
4 really troubles me is is there no one who can say,  
5 "Now, here is what you should be doing." Or am I  
6 just naive to expect that there would be someone  
7 dealing with fishes and dealing with game who would  
8 be able to tell me that?

9  
10 A I hate to disillusion  
11 you sir.

12 Q Oh, it is all right,  
13 Dr. Wilimovsky I am getting used to it.

14 (LAUGHTER)

15 A Trying to get overall  
16 planning into resource management is one of the  
17 hardest things on earth. Every government office,  
18 every planner, every university professor, all categories  
19 in this field look at their own immediate problems  
20 and Dr. Elverson and I have been speaking at  
21 international audiences for fifteen years now pushing  
22 for international planning, national planning, on down  
23 the line. I came back from Vienna a few weeks<sup>ago</sup> working  
24 with international organizations to try and do something  
25 as collect catch information on a uniform basis. Sir,  
26 that is the state of co-operative long-range planning.





Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

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Q I remain interested in  
hearing from any of you what you think should be done  
and whether it would be international or national, --

A I think positive, sir.

Q -- when you want  
to tell me, you can tell me.

A I'll tell you right now.  
If the terms of this Inquiry see it within their  
limits to recommend to the government to form a Canada-  
wide freshwater fish utilization plan in conjunction  
with the Canada-wide fish utilization plan, I am sure  
that the northern environment would be one part of that  
overall segment. If that framework is laid down, it will  
give a guideline for the management agency I'm talking  
about. It would give a guideline to the management  
agencies in this part of the country to form sub-plans.  
On the basis of that you could rationally approach the  
problem, on a very specific ad hoc arrangement. I have  
said now at least five times that what we can do is  
collect information from the sport fishery to get a  
first cut at what we can take and use safely from this  
stock. I don't know how I can make it any plainer.

Q I'm with you on that.  
Well all right, now you've outlined a kind of survey  
that you think should be done, and it's noted. Now is  
there anything else that you think should be done in  
the time frame that is reasonably available to prepare  
us for the problem of fish management in the Northwest  
Territories?



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
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Cross-Exam by Scott

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A I would recommend that the terms and conditions suggest to the national and provincial and Territorial Governments that a co-operative program on the establishment of standards for water quality be developed. Sorry, sir, I have taken all of these things to be self-evident.

Q Well, two more matters and then at least some of you will be glad to hear that I'm finished. Mr. Templeton, I'd like to deal with the code, which is really called towards an environmental code rather than a code. I recognize that, and I've read the code and two things strike me about it.

First of all, that some of the recommendations, some of the standards, if you will, are very precise and highly particularized, and some on the other hand are extraordinarily general. Now, with that -- and I take it that you obviously see that.

WITNESS TEMPLETON: Yes.

Q Now, what use is to be made of this code?

A Well, I think to explain the problems of some having a greater degree of precision than others, it's a performance code, that's what it's supposed to be, and it would be nice if you could spell all of the things out in strictly performance standards but there aren't any standards for many of things, and so we had to in some places put in very specific items which I think you're quite right in saying, "Well, that's really the place for that is a specification



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1  
2 rather than a code." But it's very difficult sometimes  
3 to write that performance standard without the sort of  
4 long-winded explanations I usually give some of my  
5 questions, and so then you had to revert to almost  
6 a specification.

7 Q Well, Mr. Templeton, would  
8 it be correct to say -- and I note that this code  
9 was prepared not by members of the Board, but by con-  
10 sultants to the Board -- would it be correct to say  
11 that this is a kind of illustration approved by the  
12 Board of the direction in which we should be moving as  
13 we attempt to develop a code?

14 A Well, this really wasn't  
15 a consultant's recommendation. These were the Board  
16 and the staff's recommendations. The people that  
17 drafted it, Greenfield and Farlinger, were just familiar  
18 with codes, they weren't familiar with everything in  
19 the pipeline, and what they did was read the Board's  
20 reports and the research reports and out of that try  
21 to get what the code items where, and then they went to  
22 each member of the Board and said, "Now, is this what  
23 you said? Is this the height that you allow them to  
24 fly? " Out of that evolved the code items, so the  
25 Board was very much involved with the content of it.  
26 The people that drafted it were --

27 Q Well, let me give you an  
28 example. One of the restrictions -- I don't know that  
29 I have the number of it, but it relates to aircraft  
30 traffic, it's 14.2.





Templeton, Adam, McTaggart-Cowan  
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Gourdeau, Thomson  
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"Aircraft traffic,"

I'm sorry, .3,

"Aircraft traffic, except to established air terminals over the Yukon coastal plan, shall be prohibited for the period between August 15 and October 15."

Now, stopping right there, that is to prohibit absolutely what now occurs, that is aircraft traffic to other than established air terminals, and I take it that that applies to everybody -- hunters, fishermen, government. Was it intended that these regulations should be read literally, or are they sort of an example of the kind of thing that we might be moving for?

A No, they should be read literally, but they don't apply to hunters, fishermen and government. They apply to this project, and the idea being that they would fly along outside, off the coast.

THE COMMISSIONER: Excuse me.  
This restriction applies only to the pipeline company?

A That's right, and its contractors and suppliers, yes.

MR. SCOTT: Q But not to any citizens who want to inspect the work.

A Oh, I don't know who --

Q What I'm getting at is surely it can be conceived that this kind of restriction, no flights between August 15th and October 15th, is designed to protect a specific environmental concern. Snow geese, I presume, or something like them.



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
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Cross-Exam by Scott

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A Yes.

3

Q So that -- but what you

4

have created by this code is a regulation that is going

5

to be enforced after the snow geese, in any given year, have

6

left simply for the sake of having a clear regulation.

7

Isn't that so?

8

A You mean supposing the

9

snow geese go before that date, why have the regulation?

10

Q Yes, and what I'm really

11

asking is did the Board give consideration and make a

12

judgment about whether this method of regulating was

13

preferred to the other method of regulation which is

14

to set up the interests to be protected and then estab-

15

lish ad hoc rules for dealing with them?

16

A Well, the difficulty, Mr.

17

Scott, is that supposing you said you wanted more

18

general ones so you've got some flexibility in them,

19

you can write the whole thing in one paragraph and say,

20

"Don't hurt the environment." But that's not good enough.

21

That's the way -- that's precisely what we were trying

22

to get away from, and what we were trying to get the

23

whole project to recognize very specific things that

24

have to be done.

25

Q Well, I understand your

26

dilemma and I recognize it, but did you consider the

27

third method which is to stipulate the environmental

28

interest you wish to protect to say how it should be

29

protected, that is by the restriction of aircraft flights

30

to nil, and then vest in the agency the power to close



Templeton, Adam, McTaggart-Cowan  
Willimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

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down air traffic for a given period of time.

A Well, I think that's possible under the code. There is a great deal of power vested in accordance with the code with the authorized officer, and I don't think that any of the codes are used in -- without using some judgment. It is the same with specifications, and this is written the same way, codes are written, and it's similar to construction specifications and if you probably listened to contractors you'll find that construction specifications are far too rigid and unfair and everything else, but they have evolved in the industry as a means of controlling the quality, as a rule.





Templeton, Adam, McTaggart-Cowan  
Willimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1 Q Mr. Templeton, I just  
2 want to get where we stand. This is not a construction  
3 specification, it is a stipulation, really, as to  
4 law. You shalt not do something.

5 A Well, that is the way  
6 a construction specification is written.

7 Q All right, what I am  
8 really asking, is this on the one hand an example of  
9 the direction we should be moving, or we should be  
10 examining, or do the Board members, having approached  
11 the philosophical questions involved in regulation  
12 conclude that this is the preferred way? Is this the  
13 Board's view about how you regulate this project, or  
14 is it merely an example that the Board thinks the  
15 public should have?

16 A No, this is the way the  
17 Board thinks it should be done.

18 WITNESS GOURDEAU: Well,  
19 I think, Mr. Scott, though we could add that as Mr. .  
20 Templeton has just said, that when we prepared the  
21 code, very often we have put "unless otherwise  
22 authorized by the agent", but we didn't put it  
23 everywhere but surely the spirit of this code --  
24 it is, as you say, a document towards an environmental  
25 code, the idea is to leave with the agency a certain  
26 authority. So, when the time comes for you to draft  
27 some conditions under which the pipeline should be  
28 built, I would suggest respectfully that you would have  
29 to just add this phrase: "unless otherwise authorized by  
30 the agency", no flights should be authorized for the



Templeton, Adam, McTaggart-Cowan  
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1 enterprise. There are certainly certain things lacking  
2 there, but in a way it could have been identified by  
3 the other researchers, that the period were very  
4 regularly between a certain date and another, I  
5 think we felt kind of obliged to put it there, but I  
6 suppose that when you suggest routes you could say  
7 something like "unless otherwise authorized", but you  
8 don't leave them to the agency to make all the rules.  
9 You specify the ones that you want to be very strict,  
10 but at the same time you give them the permission if  
11 they are not reasonable because if for a certain  
12 year they do not apply you leave them the authority  
13 to do it.

14 THE COMMISSIONER: Well, I think  
15 we have  
16 /exhausted that subject, haven't we?

17 MR. SCOTT: Well, I take it  
18 then that the balance of the Board members agree with  
19 Mr. Templeton?

20 I think that there is an  
21 important difference here. I don't think, with the  
22 greatest respect, that Mr. Gourdeau agrees with them,  
23 he says that there should be discretion within an  
24 agency to apply these rules or not.

25 WITNESS WILIMOVSKY: Mr. Scott, in  
26 my testimony in June I also used the word, "toward", and  
27 in the case of the aquatic environment at the state of  
28 the art at the time that the code was prepared by  
29 these gentlemen, from reading the aquatic material  
30 available at the time, this was the framework, the  
guideline, the code. We would expect that it is toward,



Templeton, Adam, McTaggart-Cowan  
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Cross-Exam by Scott

1 that as standards become available, they would naturally  
2 be refined.

3 THE COMMISSIONER: Well, there  
4 is always some measure of discretion in the administration  
5 of any code or law or whatever.

6 Could I ask you a question,  
7 Dr. Wilimovsky. This may have been implicit in what  
8 you were saying. When Mr. Walker, Mr. Steigenberger  
9 and Mr. Stein were here from the Fisheries, they said  
10 that in the Mackenzie River and its tributaries we did  
11 not have anything like a complete inventory of fish  
12 stocks. Mr. Steigenberger -- Mr. Stein dealt with  
13 the river, or the valley; Mr. Steigenberger and Mr.  
14 Walker dealt with the north coast, and they said on  
15 the north coast we didn't have anything like a complete  
16 inventory of fish stocks. I am sure you know the  
17 passages in there that I am referring to.

18 They said that they felt,  
19 it was their recommendation, that there should be a  
20 complete inventory, that is, we should at least discover,  
21 this, I think is as far as they went, in what streams  
22 and rivers and bodies of water along the route of the  
23 pipeline there were populations of fish that we  
24 didn't now know about, suspected in some instances, and  
25 you may recall, Mr. Steigenberger gives a very complete  
26 list of the streams and the rivers and the bodies of  
27 water where he suspected there were fish populations.

28 Now, they all said that it  
29 would take two or three years with a considerably --  
30 with a program better funded than the one that they now





Templeton, Adam, McTaggart-Cowan  
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Gourdeau, Thomson  
Cross-Exam by Scott

1 have. It would take two or three years to do a proper  
2 inventory. Not until then, they said, should a pipeline  
3 be approved. Do you have any comment on their evidence,  
4 on that particular issue?

5  
6 A I talked with Mr.  
7 Steigenberger about his testimony and his opinions on  
8 this in relation to the realities of government funding,  
9 available personnel, and so forth; and I guess it  
10 comes down to what one means by a complete inventory  
11 because a visit to a lake or stream at one point in  
12 time may give you what is there at the time, but no  
13 way is that an inventory in the sense, no way is it a  
14 complete inventory, because you have got to know  
15 what the variation is about the year. Then one gets  
16 into the very ticklish question that was so long  
17 debated here in what is a significant river or stream,  
18 and I think that some judgment must be used.

19 I believe that it would be  
20 highly desirable to have a survey taken at short time  
21 intervals for all the major streams and lakes. I am  
22 not sure that this is the best use of personnel and  
23 funds, not having this overall management plan. I  
24 certainly wouldn't spend time in completing a  
25 detailed inventory of an entire area if the project  
26 plans and the analysis of policy failures and this  
27 kind of contingency plans indicated that such and  
28 such an area was likely to receive a lot of pressure  
29 and be subject to the possibilities of accident in  
30 construction.

Instead of working on inventory,



Templeton, Adam, McTaggart-Cowan  
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Cross-Exam by Scott

1 I'd be working on stock size, their sensitivity,  
2 their variability. In other words, there are different  
3 things that you would look at under different states  
4 of stress and I guess that one must always say that  
5 there is more to be learned and more to be sought, but  
6 at the present state of moving a line back and forth  
7 and we haven't looked at the alternatives, it is  
8 hard to be specific for you, sir, and say we should  
9 do more work here.  
10

11 It is true that there are  
12 very few places in North America where an inventory  
13 of the kind that I think was implied has been done and  
14 you must extrapolate. My own suggestion would be  
15 that if the areas of concern or potential concern could  
16 be pinpointed, I would do a lot of work on those. Not  
17 having any other information and time and funds available  
18 I suppose I'd continue with inventory.

19 THE COMMISSIONER: You'd  
20 continue with what?

21 A Inventory.

22 THE COMMISSIONER: Yes.

23 MR. SCOTT: Mr. Commissioner,  
24 I just have one more question and, Mr. Templeton, about  
25 this code, I want to be sure that I understand what the  
26 Board contemplates by this code. We want to use it  
27 if we can, but I understood Mr. Gourdeau and Mr.  
28 Wilimovsky to suggest that there will, A) be some  
29 discretion in its application in the first case, and that  
30 it will be modified as work develops.



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1 I take it that really there  
2 is nothing in the code that is immune from modification  
3 and, for example, when you say that there shall be  
4 no flights over the Yukon north coast in a given  
5 period of time, it is for the modifiers to decide  
6 first of all, what environmental interest you are  
7 trying to protect, whether it is snow goose, or the  
8 horned grebe or some such other bird; and secondly,  
9 what the requirements of protection for that particular  
10 bird is. Have I got that right?

11 WITNESS TEMPLETON: Yes, I  
12 think the agency must understand what is the reason  
13 for the item.

14 Q Well, the trouble is,  
15 you see, that is very difficult, because when you come  
16 to Article 14.9, "compressor stations shall be  
17 equipped with silencing equipment." Now, I am generally  
18 all in favour of imposing that financial obligation on  
19 Arctic Gas, but it seems to me that the question raised  
20 with which you haven't dealt is with what species are  
21 you desirous of protecting by the introduction of  
22 silencing equipment on a plant in the north?  
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A Well, but just a minute now. That's why it's called "Towards a Code" and --



Templeton, Adam, McTaggart-Cowan  
Willimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1  
2 Q That's why I opened it  
3 that way.

4 A There isn't any question  
5 in the introduction we say this very carefully, and I  
6 won't read it to you but where we recognize that we did  
7 not have all of the disciplines needed to write a proper  
8 code, and we didn't have all the skills. We had no  
9 regulatory people and we had no pipeliners. We were  
10 trying to interpret the information that we obtained  
11 into a form that a pipeliner can understand and act by.  
12 We recognized we didn't have enough skills in this so  
13 we wrote as best we could, and that's why we call it,  
14 "Towards a Code."

15 We suggested or still suggest that a larger group be  
16 put in, certainly it would have to have regulatory and  
17 pipeline people, to hammer out some of these clauses.

18 Q But Mr. Templeton, I  
19 think really what it comes down to is this, if the  
20 Inquiry in its recommendations, or the agency developed  
21 a different set of regulations, let us say with respect  
22 to overflights on the North Coast, the Environment  
23 Protection Board would not be upset provided the  
24 environmental interest they desired to protect, they  
25 perceive to be protected by our regulation.

26 A Certainly.

27 Q The fact that we permitted  
28 flights on September 15th would be beside the point if  
29 the environmental interests that you have at heart was  
30 protected.



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

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A Certainly.

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MR. SCOTT:

4

I want to thank the Board particularly for the taxing, that they must have found at times boring cross-examination. I found it most useful and I'm very grateful to them. We won't enquire whether anybody else has found it interesting.

8

9

THE COMMISSIONER: Could I just ask one question of you gentlemen before you leave?

10

11

Q We had a discussion about

wilderness and so forth and so on and I got out Dr.

12

McTaggart-Cowan's lecture at the University of California

13

in 1966 on wilderness, and it's very helpful, but one

14

thing that it raised in my mind was this. The sugges-

15

tion was made -- Mr. Scott, I think, by way of simply

16

bringing on all facets of opinion -- was asking a witness

17

here one day what the value of the -- each snow goose

18

was in California. I think it spends its winters in

19

California, I've forgotten now, and it was \$50 a bird

20

or something like that. The suggestion was made that

21

this might well be a means of weighing environmental

22

values against better known and more easily quantifiable

23

economic values, and I -- this is no reflection on Mr.

24

Scott, at the time I suggested this was a pretty poor

25

way of tackling the problem --

26

MR. SCOTT: It's no reflection

27

on you, sir, as far as I'm concerned.

28

THE COMMISSIONER: -- because

29

it seemed to me the value of the oil and gas in the

30

Arctic probably exceeded by many times any saleable





Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

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2 value placed on the birds, the caribou and so on and  
3 so forth. Maybe not, because if you regard the resources  
4 as one that exists in perpetuity, and the oil and gas  
5 is something that has a very limited life, maybe they  
6 do come out pretty much the same in 100 years, I don't  
7 know. But in any event, this lecture of Dr. McTaggart-  
8 Cowan's about wilderness values refers to a great many  
9 people -- Leopold, Thoreau and so on. Do you gentlemen  
10 take the view that there are values to be weighed on  
11 the scale, you have probably already said as much,  
12 but before you go I'd like your views. There are values  
13 to be weighed in the scale when we come to wilderness  
14 of the environment that are simply not quantifiable,  
15 that you're referring to what some might call a higher  
16 order of priorities than <sup>the</sup> market recognizes. Is that  
17 something you gentlemen would agree with, or do you  
18 take the view that you ought to seek to reduce wilderness  
19 environmental values to quantifiable terms so that they  
20 can be weighed in the balance against the value of oil  
21 and gas and so on and so forth? Does anyone wish to say  
22 anything about that?

23 WITNESS MCTAGGART-COWAN: I can't  
24 miss the opportunity to do so, sir. I would agree  
25 with your second statement. I'll make it as brief as  
26 I can, that to the true devotee of wilderness in the  
27 technical sense, it would be like trying to put a  
28 price on Westminster Abbey or the chapel at King's  
29 College.

30 THE COMMISSIONER: And you can't



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1  
2 put a price on Cathedral Grove or the Ramparts.

3 A That's right.

4 Now there have been some ingenious attempts by economists  
5 -- some of them very competent and interesting attempts  
6 -- to build the externalities into this kind of evaluation  
7 system. You can, for instance, take the snow goose  
8 population, if you like, and say, "All right, the yield  
9 is so many thousand birds a year at X dollars per bird,  
10 and this is the interest on an investment. What is  
11 the size of the investment?" And you pro rate that over  
12 a century or two centuries and you come up with some  
13 kind of a value.

14 Others have tried to put a  
15 value on it by the value of the gains foregone by the  
16 user. If I am employed at a lawyer's fee per day, and  
17 I propose not to take that fee for ten days to go  
18 hunting, it has been stated that the caribou you don't  
19 get has a considerable value. There are a number of  
20 ways, but I prefer at the present state of the art not  
21 to get into that attempt.

22 WITNESS WILIMOVSKY: Mr. Commis-  
23 sioner, the competition between salmon and dams on the  
24 Fraser River has resulted in a great many attempts to  
25 try and quantify the living resource, and these studies,  
26 as Dr. Cowan indicates, use some very interesting and  
27 different kinds of techniques, some highly sophisticated.  
28  
29  
30



Templeton, Adam, McTaggart-Cowan  
Willimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

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2 In the long run, when the answers have come in, it is  
3 very difficult for a person who doesn't look at the  
4 analysis in the same way as the proponent of the analysis  
5 to perceive these kinds of data with the same sense of  
6 security that one does with counting animals for real  
7 dollars. Analyses have been tried using this principle  
8 of what it would cost to give up, but the problem has  
9 been in achieving agreement of the subjective value of  
10 what you give up.

11 WITNESS BLISS: I would just  
12 add in terms of completing the ecosystem that while we  
13 have attempted at times to quantify wildlife value, it  
14 is almost, I would say it's impossible to quantify this  
15 in terms of vegetation and micro-organisms that are  
16 intimately involved in these cycles and so that in total  
17 analysis, although small components can be quantified,  
18 much of the very basis of these wild lands cannot so  
19 that it's almost futile to attempt.

20 THE COMMISSIONER: Thank you.

21 WITNESS TEMPLETON: Mr. Commissioner  
22 that completes the questioning of the Board?

23 THE COMMISSIONER: I think so.

24 MR. SCOTT: Are we going to  
25 take a coffee and tea break? Do you want to finish,  
26 Mr. Templeton, before the tea break?

27 WITNESS TEMPLETON: Well, I have  
28 about six minutes, if I could make an announcement, Mr.  
29 Commissioner.

30 THE COMMISSIONER: Yes.





Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

1  
2 A I have this written, and  
3 perhaps I could pass it around to the participants.  
4 It's the termination of the Environment Protection  
5 Board. This Board was organized in September, 1970,  
6 its goal was to influence the Mackenzie Valley Gas  
7 Pipeline, to limit environmental change, to what to  
8 us was a reasonable and acceptable degree. We hope to  
9 continue through the planning and construction phase  
10 and to make a post-construction evaluation.

11 The Board was to be autonomous,  
12 it should study what it wanted to study and report its  
13 findings as it went along, and express opinions,  
14 criticisms, and recommendations without the right of  
15 edit by its sponsor.

16 The sponsor did, however, have  
17 the right of approval of the overall budget and both  
18 the sponsor and the Board had the right to terminate  
19 the arrangement at any time.

20 The initial arrangement was  
21 with Alberta Gas Trunk Line Company who was the sponsor  
22 for the first year. Subsequently, the sponsor became  
23 Gas Arctic Systems, and the arrangement stayed the  
24 same. Early in 1972, the merger of Gas Arctic and  
25 Northwest Project Study Group formed a new sponsor,  
26 CAGSL.

27 CAGSL agreed to continue to  
28 sponsor the Board, but to reduce the risk of duplication  
29 CAGSL would decide whether the Board's forces should  
30 perform investigations in the field or whether these



Templeton, Adam, McTaggart-Cowan  
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Cross-Exam by Scott

1  
2 should be done by CAGSL's own forces. CAGSL agreed  
3 to provide free access to all the engineering and envir-  
4 onmental data collected by the sponsor or its contactors.  
5 The Board reported this change in a Newsletter dated  
6 February, 1973, and concluded with this paragraph:

7 "If, subsequently, the Board feels that the  
8 loss of control over field studies, or an  
9 eventual reluctance, presently unexpected,  
10 of the sponsor to provide pertinent data,  
11 prevents it from performing an effective  
12 role in northern environm ent protection,  
13 it will try to negotiate a satisfactory  
14 arrangement and if this is not possible  
15 terminate its relations with the sponsor."

16 When the Board obtained the  
17 details of the project description in the application,  
18 the Board then wrote its environmental impact assessment  
19 which was published in September, 1974. The report was  
20 not edited by the sponsor, nor was there any attempt to  
21 edit it.

22 Subsequently, at a meeting on  
23 November 29, 1974, we were advised that CAGSL would  
24 not fund the Board beyond the attendance at the hearings.  
25 This also meant stopping publications and the investi-  
26 gation of other matters that arose. The Board, which  
27 by then was a participant at the hearings, felt that a  
28 necessary step towards its goal was the presentation of  
29 its environmental impact assessment report, so it  
30 reluctantly accepted the limitations set by CAGSL.



Templeton, Adam, McTaggart-Cowan  
Wilimovsky, Craik, Bliss  
Gourdeau, Thomson  
Cross-Exam by Scott

The Board presented a condensed version of its impact predictions and its recommendations to these hearings on June 2, 3, and 4, 1975. The cross-examination of that testimony has been completed today. We were not in a position to address a number of matters, such as route revisions, looping, and corridor in June 1975. This is because in 1975, 600 miles of the planned route had been abandoned, and 450 miles of the route substituted, including the crossing of the Mackenzie Delta. The information supplied by CAGSL on either the project description or the environment was not adequate for us to make an impact assessment on these new route relocations. The conclusion mentioned in Volume 1 of our impact assessment states in part:

"The Board has found that if reasonable precautions are taken and certain activities restricted to specific times of the year and locations, as indicated by our atlas and suggested environmental code, then environmental damage could be held to what in our opinion is an acceptable level. This does not infer, however, that damage will be held to what in our opinion is an acceptable level."

We were not, and still are not in a position to say that this applies to the new route and so our conclusions regarding overall impact and acceptability may be invalid.

CAGSL advised us in October, 1975, that they would not fund the Board to perform any investigations on route changes. They would, however,





Templeton, Adam, McTaggart-Cowan  
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continue their commitment to fund our involvement at the hearings.

The Board met on November 5, 1975 and decided that if it was to perform its role it must at least:

- . Revise its impact assessment to reflect the new project description.
- . Revise its environmental Atlas to reflect the route changes and incorporate new information brought up at the hearings.
- . Develop terms and conditions for winter roads and frost heave related matters.
- . Review the agency requirements in conjunction with the pipeline company's latest project planning (i.e. key decision dates).
- . Develop control procedures for interaction between agency and project.
- . Investigate the Alaskan experience with reference to our recommendation to establish an environmental auditor group.
- . Respond to the Commissioner's request for comments on looping, corridors and cumulative impact.

The Board submitted a budget to CAGSL on November 20, 1975 to perform this work, and was advised on December 4, 1975, that the budget could not be met and the Board would be limited to attendance at the hearings, and one meeting in 1976.

We have therefore advised CAGSL today that we will terminate our relationship with



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1  
2 it on January 17, 1976, and that the opinions expressed  
3 by us on the "conditional acceptability to us" of the  
4 pipeline do not necessarily apply to the route changes.

5 In the years that we have been  
6 involved in the environmental study and assessment  
7 process of this major project there has been immense  
8 progress made in the procedure of impact assessment  
9 and in concept and design of mitigative measures.

10 We believe that the concept of  
11 this Environment Protection Board is a useful and  
12 worthwhile one, but the circumstances under which the  
13 concept was generated and its aims pursued have now  
14 been changed. It seems best, therefore, to dissolve  
15 the Environment Protection Board.

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1  
2 Finally, we would like  
3 to say that although we have had our disagreements with  
4 each of our sponsors, we must give them full marks for  
5 making our continued existence possible. We know of  
6 no other organization in either the government or  
7 private sectors of Canada which have sponsored an  
8 autonomous group such as ours having as it does a  
9 focus different from that of the sponsor, yet is able  
10 to publish its opinions to friends and foes alike without  
11 the sponsor's control or rights of edit.

12 Signed by the members of the  
13 Board.

14 MR. MARSHALL: Mr. Commissioner,  
15 I think Mr. Workman wishes to say a word in response  
16 to the statement that has just been given.

17 MR. WORKMAN: On behalf of  
18 Canadian Arctic Gas I would just like to say that I  
19 think that everybody appreciates the effort that has  
20 gone into the work by the Environment Protection  
21 Board. We realize the value of your work to all  
22 Canadians. We appreciate the value to the people in  
23 the Mackenzie District, and I think we all appreciate  
24 very much the effort you have made to the benefit  
25 of this Inquiry, and on behalf of Canadian Arctic  
26 Gas, I would like to thank the Board very much for  
27 this effort.

28 WITNESS TEMPLETON: Thank  
29 you, Mr. Workman.

30 THE COMMISSIONER: I think I





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1 should say that in an address that I gave at Queen's  
2 University in November I suggested that both Arctic  
3 Gas and Foothills should be commended for -- Foothills  
4 being, I understand, a member of the consortium when  
5 the Board was established -- should be commended for  
6 this departure, that is, the establishment of the  
7 Board and the funding and autonomy provided it, and  
8 especially for the recruitment of such a distinguished  
9 group of Canadians to act as the Environment Protection  
10 Board, and I said then and say now that the concept  
11 should be one that industry should emulate in the  
12 future, and even though in a sense the relationship  
13 between Arctic Gas and the Board appears to have  
14 hit a fairly rocky patch, and you have decided to  
15 dissolve it, the fact is that the Board has made an  
16 absolutely vital contribution to this Inquiry and  
17 to the understanding of Canadians of their own  
18 northland in the wider world.

19 So, having thanked Arctic Gas  
20 and Foothills, I should like to thank you, Mr. Templeton,  
21 and the members of the Board for the assistance that  
22 you have given the Inquiry and for the patience that  
23 you have shown. We have all learned a great deal from  
24 each one of you and I don't want this to sound like  
25 a grave side address, so I think I should remind everyone  
26 in the room that I think some of these gentlemen will  
27 be remaining and others will be witnesses again, though  
28 not for the Board, and we expect to hear a good deal  
29 more from all of you in your individual capacities. I  
30 can only say, Mr. Templeton, that I will regret very  
much losing you as one of the lawyers appearing before



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1 the tribunal, and I just hope that the others will  
2 remember the example you have offered throughout the  
3 proceedings, the brevity of your questions --

4 (LAUGHTER)

5 -- and the incisiveness of  
6 your objections, and if that is remembered, it will  
7 be of great assistance to us for the remainder of the  
8 Inquiry.

9 MR. SCOTT: Mr. Commissioner,  
10 I have given Mr. Templeton my assurance, which I am  
11 sure that all other counsel acting for participants  
12 would accept, that insofar as he is able to fund  
13 himself, if that is the appropriate expression, if  
14 he intends to ask questions or make submissions, I,  
15 for my part and I am sure all other participants for  
16 their part, will not do anything but greet his  
17 presence with pleasure, bearing in mind that  
18 he has participated throughout in the work of the  
19 Board and to date in the work of the Inquiry. So, I  
20 would hope that while will limit the number of speeches  
21 he is entitled to make on a daily basis, we will be  
22 very upset, indeed, if he isn't making at least some  
23 along the way.

24 THE COMMISSIONER: Well, thank  
25 you again. We will adjourn for a cup of coffee.

26 (WITNESSES ASIDE)

27  
28 (PROCEEDINGS ADJOURNED FOR A FEW MINUTES)  
29  
30



1 (PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

2 THE COMMISSIONER: Maybe  
3 we should adjourn until tomorrow.

4 MR. SCOTT: Well, sir, we  
5 have a single piece of evidence that has to be  
6 read. Would you rather have that read in the morning,  
7 sir?

8 THE COMMISSIONER: How long  
9 will it take?

10 MR. SCOTT: About half an  
11 hour. Well, let's leave it until the morning then and  
12 we will be fresh. We want to do justice to it.

13 MR. VEALE: Mr. Commissioner,  
14 the application that I am about to make, I should say,  
15 at the outset, has no relationship to the comments of  
16 Magistrate O'Conner at the luncheon today. They were as  
17 much as a surprise to me as I am sure they were to  
18 you.

19 I am bringing this application  
20 at this time because the timetable of this Inquiry is  
21 of considerable importance and it is always a matter of  
22 great discussion among counsel and I feel that I would  
23 like the matter to be put on the table at this time.  
24 I appreciate that what I am asking for which I will  
25 set out shortly, is something that will not be done in  
26 the near future as the timetable has been pretty well  
27 set until June of this year.

28 The application is for a  
29 direction from this Inquiry that community hearings  
30 be held for the native people in the Yukon Territory





1 along the Fairbanks route, more commonly referred to  
2 as the Alaska Highway in the Yukon Territory.

3 The application involves the  
4 following communities beginning from the Alaska  
5 border: Burwash Landing, Haines Junction, Champagne  
6 Aishihik, the spelling of that is A.I.S.H.I.H.I.K.,  
7 Whitehorse, Teslin, and Upper Liard, near Watson  
8 Lake. The application is restricted to the Fairbanks  
9 route based on our assessment of the evidence to  
10 date at this Inquiry which is indicated that the  
11 preferred alternate route appears to be the Fairbanks  
12 route.

13 Firstly, I would like to  
14 deal with your jurisdiction in this matter, as that  
15 was raised when the matter first came before the Inquiry  
16 in December. Pages 10 and 11 of the expanded Pipeline  
17 Guidelines of 1972 indicate that the applicant must  
18 provide three things with respect to transportation  
19 corridors. Firstly, the assessment of the suitability  
20 of the applicant's route for the nearby routing of the  
21 other pipeline, presumably the oil pipeline; secondly,  
22 an assessment of the environmental and social impact  
23 of both pipelines on nearby settlements; thirdly, and  
24 this is the area that I direct our attention to today,  
25 a comparison of the applicant's proposed route  
26 with alternative pipeline routes in terms of environmental  
27 and social factors as well as technical and cost  
28 considerations and bracketted the statement that  
29 (fully engineered proposals are not required).

30 Now, the order-in-council



1 authorized the Inquiry to have regard to any proposals  
2 to meet the specific environmental and social concerns  
3 set out in those guidelines, and I respectfully  
4 submit that we are now considering a social concern  
5 within the jurisdiction of this Inquiry.

6 To this date we have heard  
7 evidence in Whitehorse and in Yellowknife relating to  
8 technical and cost considerations as well as environ-  
9 mental and some social factors. Arctic Gas has  
10 stated in Whitehorse, and I quote:

11 "It can be argued that because the populated  
12 portions of the Yukon are more mature in  
13 economic terms, the ultimate value of  
14 secondary benefits would be lower in that  
15 sub-region than would be the ultimate  
16 value of secondary impact in the less mature  
17 Mackenzie Valley. Without a major new  
18 development the Mackenzie Valley region faces  
19 a steady deterioration of the present  
20 precarious economic and social situation.  
21 The Yukon, on the other hand, has a relatively  
22 more well developed infrastructure with a  
23 significant level of economic activity in  
24 the service and resource sectors."

25 Now, we have also heard comments to the extent that  
26 that very situation is an argument for having a pipeline  
27 down the Fairbanks route. The upshot of the evidence,  
28 of course, is that there is a distinct difference in  
29 the stage of development in the two territories.

30 In our view, that thesis has



1 not been tested by hearing the evidence of the native  
2 people in the Yukon Territory.

3 Now, it is also my submission  
4 that -- I was reading page 10 of your preliminary rulings,  
5 number one, that these community hearings would come  
6 within the scope of the purpose of the corridor  
7 phase and the alternate routing phase as being to  
8 minimize the social and environmental disruption, and  
9 to that extent, my submission is that this evidence  
10 that you would hear in those communities would be  
11 extremely valuable for this Inquiry.

12 Now, Mr. Commissioner, you  
13 have indicated that your mandate is to conduct a  
14 fair and a thorough Inquiry, and you have also stated  
15 that you intend to give all those persons and organizations  
16 with an interest in the proposal made by Arctic Gas  
17 a fair opportunity to be heard. It is my respectful  
18 submission, and I repeat, that without any information  
19 or views from the native people along the Fairbanks  
20 route, that recommendations made by this Inquiry with  
21 respect to that route would be incomplete.

22 There is an added advantage  
23 to such hearings in that those people, the native  
24 people along the Fairbanks route have already experienced  
25 a large scale development of the nature that the  
26 applicant proposes. Such evidence will be highly  
27 relevant, not only to the social impact, on that  
28 particular alternative route, but also the anticipated  
29 impact on any other route. Now, I don't wish to  
30 anticipate all the arguments that will be made contrary





1 to the one that I am proposing now, but no doubt the  
2 applicant will argue that the hearings are of little  
3 value because there is no active proposal to build the  
4 gas line on that route. This, I submit, with respect,  
5 is a short-sighted view.

6 This Inquiry has listened to  
7 numerous experts indicating that from an environmental  
8 viewpoint, the Fairbanks route is desirable. The  
9 Inquiry has also been advised of the recommendations  
10 of the environmental staff of the Federal Power Commission  
11 with respect to the Fairbanks route as an alternative  
12 route.

13 THE COMMISSIONER: That was  
14 the staff of the Federal Power Commission --

15 MR. VEALE: I believe so --

16 THE COMMISSIONER: Its  
17 preliminary Environmental Impact Statement.

18 MR. VEALE: The draft, I  
19 believe.

20 THE COMMISSIONER: The draft,  
21 I mean, yes.

22 MR. VEALE: There is also the  
23 reality that none of the present applicants may be the  
24 ultimate builder of a gas pipeline.

25 Further, I submit that it is  
26 of more than historical interest that prior to the  
27 construction of the Alaska Highway, a five member  
28 Canadian Commission was created in 1938 to consider  
29 that project. The assumption of that Commission and  
30 of those who appeared before it was that the route would



1 run up through Whitehorse via Dawson City.

2                               The submissions made by  
3 people who participated in the Inquiry generally dealt  
4 with whether the highway should run on the east side  
5 or the west side of the Yukon River, and the Canadian  
6 Commission ultimately in its report several years  
7 later gave first preference to the route through  
8 Dawson City, but events of the war made those particular  
9 recommendations irrelevant.



1 Now, it is of interest that  
2 two weeks after the hearings of that Commission held  
3 in Whitehorse on July 14, 1939, the American Highway  
4 Commission arrived in Whitehorse, not to hold hearings  
5 but simply for informal discussions, and press reports  
6 indicated that the members of that Commission let it  
7 be known that there were many advantages in constructing  
8 the highway through the Kluane country rather than going  
9 north to Dawson City.

10 Now at this particular time  
11 this Inquiry has the advantage of being aware of pre-  
12 ferences for a particular routing prior to the completion  
13 of public hearings. Now this Inquiry has very legiti-  
14 mate concerns about timing. However, I submit that this  
15 application does not in fact involve any further  
16 preparation by either of the applicants. In all  
17 probability, the hearings in the communities along the  
18 Alaska Highway could be held in one day. The need for  
19 interpretation is significantly less in those communities  
20 than it is in the Community of Old Crow, for instance,  
21 which we have already been to.

22 In the meetings of counsel on  
23 this matter there was at one point an inference that  
24 this application was part of the land claims negotiations  
25 posture for my clients, and I wish to dispell that at  
26 this particular time. This application has no relation-  
27 ship whatsoever to those negotiations presently under  
28 way.

29 Finally, Mr. Commissioner,  
30





1 I repeat that the consideration this Inquiry has given  
2 to the Fairbanks route to date has been enlightening  
3 and has provided this Inquiry with a comparison with  
4 the applicant's proposed route. I feel at this time  
5 that that enquiry that we have initiated should now  
6 be completed.

7 THE COMMISSIONER: Thank you,  
8 Mr. Veale.

9 MR. SCOTT: Mr. Commissioner,  
10 though it isn't my turn to speak next, perhaps in  
11 view of what I have to say I should be heard next.  
12 It's simply this, that I would ask you to give con-  
13 sideration, unless there be strenuous objection from  
14 any participant -- unless there be any objection from  
15 any participant, to adjourning the disposition of this  
16 matter and the balance of the submissions on it, until  
17 later in our timetable, and I'm thinking of a date as  
18 late as the end of March, and that's for two reasons.  
19 It's useful to have it said to you that your hearing  
20 must be full and fair, but it goes without saying that  
21 it must be full and fair but restricted to the things  
22 that you're authorized to hear, and no further; and  
23 so there is a fundamental question about whether the  
24 order-in-council appointing the Commission, <sup>and the</sup> supporting  
25 documents incorporated in it, warrant the kind of  
26 enquiry that Mr. Veale seeks. Even if the answer to that  
27 be affirmative, that yes, it is warranted, there is a  
28 subsidiary, but just as important a question is whether  
29 in the circumstances it is appropriate to launch onto  
30 this kind of an enquiry within your jurisdiction. In



1 other words, you don't have to do everything within  
2 your jurisdiction; you just have to do what is  
3 appropriate within your jurisdiction.

4 Now those are two serious and  
5 difficult questions, and Mr. Veale is aware, because  
6 he's acknowledged it, and because he has been with us  
7 for some time, that even if his motion were granted now  
8 it would not be feasible to conduct the hearings that  
9 he seeks before June of this year. The timetable until  
10 being pretty well occupied, and that being so, and  
11 bearing in mind the relatively limited amount of  
12 preparation that he himself has conceded is required  
13 on his part, it seems to me that no real harm can be  
14 done to his interest or the interest of anybody else  
15 by forestalling the decision of the matter until March.

16 If we do that, that will  
17 enable us to make then the submissions we would now  
18 make on jurisdiction. It will enable us also to do  
19 then what we cannot do now, that is to assess whether,  
20 assuming the enquiry is within your jurisdiction, it  
21 is appropriate to embark on it in order that the hearing  
22 be complete. So I would ask that you give consideration,  
23 I don't think Mr. Veale objects to it, to dealing with  
24 the matter on that basis. It may be that the other  
25 participants either agree or don't, I don't know.

26 MR. MARSHALL: I support the  
27 proposal put forth by Mr. Scott, sir.

28 MR. VEALE: Well, Mr. Commis-  
29 sioner, I have no strong objection to that proposal.  
30 My concern, however, is that the timetable constraints



1 may have some effect on the ultimate disposition, and  
2 as long as Mr. Scott is indicating that he is not going  
3 to raise those constraints, then perhaps I can concede  
4 to his proposal.

5 THE COMMISSIONER: Well, I think  
6 that we should do what Mr. Scott suggests. We are  
7 going to Inuvik Monday. We won't be returning to  
8 Yellowknife until March 15th, Monday, March 15th, two  
9 months from now. The matter can be examined at that  
10 time and it seems to me that the unfolding of events  
11 before other tribunals in this country and in the  
12 United States, and the gathering of additional evidence  
13 may place your proposal -- the gathering of additional  
14 evidence before those other tribunals may place your  
15 proposal in a different context by the time we come  
16 to re-examine it on March 15th. Who would have  
17 predicted when we -- when this Inquiry was established  
18 in March, 1974, that there would be two companies  
19 seeking to build a Mackenzie Valley Pipeline by the  
20 time the hearings got under way in 1975?

21 The final environmental  
22 impact statement of the staff of the F.P.C. may be  
23 available by March 15th as well. It might put a  
24 different texture on this.

25 On the other hand, it may be  
26 that considerations may well have arisen in the meantime  
27 that might, for all we know, lead you to withdraw your  
28 motion. So that being understood, I think we'll adjourn  
29 until 9:30 tomorrow when I understand the cross-examina-  
30 tion of Dr. Calef and Dr. Lent -- forgive me, I said





1 Dr. Dent earlier -- when Dr. Lent will proceed. Is that  
2 the program?

3 MR. SCOTT: Yes. Counsel for the  
4 Northern Assessment Group is calling another witness  
5 who will be on that panel, as I understand it, and his  
6 evidence will be read first, and then the cross-examina-  
7 tion will proceed and perhaps we'd just better begin at  
8 the top of the batting order in terms of cross-examina-  
9 tion and go through it as we normally would.

10 MR. MARSHALL: What was that?

11 MR. SCOTT: Well, we can begin  
12 again.

13 MR. MARSHALL: Sir, at least  
14 it can be considered through silence that I have consented.  
15 I wish to record for the record that I advised my learned  
16 friend that I had inadequate notice of his intention  
17 to call the additional witness on the caribou panel  
18 and I considered that we would not be ready to cross-  
19 examine. We would require the ordinary notice; through  
20 a super-human effort on Mr. Carter's part, sir, we  
21 now find we're going to be ready, and we will proceed  
22 this time.

23 THE COMMISSIONER: Well, thank  
24 Mr. Carter.

25 (LAUGHTER)

26 (PROCEEDINGS ADJOURNED TO JANUARY 15, 1976)

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Berger

AUTHOR

14 Jan., '76.

Mackenzie Valley Pipeline  
Inquiry

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vol.109







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MACKENZIE VALLEY PIPELINE INQUIRY

Government  
Publications

IN THE MATTER OF APPLICATIONS BY EACH OF

(a) CANADIAN ARCTIC GAS PIPELINE LIMITED FOR A  
RIGHT-OF-WAY THAT MIGHT BE GRANTED ACROSS  
CROWN LANDS WITHIN THE YUKON TERRITORY AND  
THE NORTHWEST TERRITORIES; and

(b) FOOTHILLS PIPE LINES LTD. FOR A RIGHT-OF-WAY  
THAT MIGHT BE GRANTED ACROSS CROWN LANDS  
WITHIN THE NORTHWEST TERRITORIES,

FOR THE PURPOSE OF A PROPOSED MACKENZIE VALLEY PIPELINE

and

IN THE MATTER OF THE SOCIAL, ENVIRONMENTAL AND  
ECONOMIC IMPACT REGIONALLY OF THE CONSTRUCTION,  
OPERATION AND SUBSEQUENT ABANDONMENT OF THE ABOVE  
PROPOSED PIPELINE

(Before the Honourable Mr. Justice Berger, Commissioner)

Yellowknife, N.W.T.

January 15, 1976.

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PROCEEDINGS AT INQUIRY

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Volume 110

CANADIAN ARCTIC  
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APPEARANCES:

Mr. Ian G. Scott, Q.C.,  
Mr. Stephen T. Goudge,  
Mr. Alick Ryder and  
Mr. Ian Roland for Mackenzie Valley Pipeline  
Inquiry;

Mr. Pierre Genest, Q.C.,  
Mr. Jack Marshall, and  
Mr. Darryl Carter for Canadian Arctic Gas  
Pipeline Limited;  
Mr. Reginald Gibbs, Q.C.,  
Mr. Alan Hollingworth &  
Mr. John W. Lutes, for Foothills Pipe Lines Ltd.;

Mr. Russell Anthony &  
Pro. Alastair Lucas for Canadian Arctic Resources  
Committee;

Mr. Glen W. Bell and  
Mr. Gerry Sutton, for Northwest Territories  
Indian Brotherhood, and  
Metis Association of the  
Northwest Territories;

Mr. John Bayly  
or  
Miss Leslie Lane for Inuit Tapirisat of Canada,  
and The Committee for  
Original Peoples Entitle-  
ment;

Mr. Ron Veale and  
Mr. Allen Lueck for The Council for the Yukon  
Indians;

Mr. Carson H. Templeton, for Environment Protection  
Board;

Mr. David Reesor for Northwest Territories  
Association of Municipal-  
ities;

Mr. Murray Sigler for Northwest Territories  
Chamber of Commerce.

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Yellowknife, N.W.T.

January 15, 1976.

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. SCOTT: May I begin by making a short announcement?

THE COMMISSIONER: By all means.

MR. SCOTT: The representatives of the Commission counsel staff have met on a number of occasions with personnel from the Beaufort Sea project in order to determine, among other things, what evidence they may have to give to the Inquiry, and the representatives of the project have been good enough to make available to us -- in, I think, only limited quantities -- a number of reports that have been prepared for them which can be made available to participants in the Inquiry for Inquiry purposes. These reports are in every case not yet published, although they are slated for publication soon. Some of them in fact are reports in non-final draft form, and they're submitted on that basis. I thought it might be convenient because some of them might be useful as background information for the work that begins at Inuvik on Monday -- on Tuesday, if I were to read the names of the reports -- and I'll just read them right through.

"The effect of contact and ingestion of crude oil on ring seals of the Beaufort Sea,"  
Technical Report No. 5.

"Nitrogen fixation in Arctic Marine sediments,"  
Technical Report No. 9.

"Distribution and abundance of polar bears





1 in the Eastern Beaufort Sea,"

2 Technical Report No. 1.

3 "Effects of crude oil on Arctic marine  
4 invertebrates,"

5 Technical Report No. 11.

6 "Sea ice morphology in the Beaufort Sea,"  
7 Technical Report 36.

8 "Real time environmental prediction system,"  
9 Technical Report No. 20.

10 "Biological productivity of the Southern Beau-  
11 fort Sea, the physical chemical environment  
12 on the plankton,"

13 Technical Report No. 12-A.

14 "Storm surges,"

15 Technical Report No. 19.

16 "Mackenzie River input to the Beaufort Sea,"  
17 Technical Report No. 15.

18 "Offshore drilling for oil in the Beaufort  
19 Sea and preliminary environmental assessment,"

20 Now, we have one copy of each  
21 at the present time, which will be kept at the Inquiry  
22 offices for reference. Dr. Fyles has indicated that  
23 there is a limited offer which I presume will be revoked  
24 if too many people require its performance, to make  
25 copies for participants who really need them.

26 Now, in addition there will be  
27 other reports from the Beaufort project that will pro-  
28 bably be made available to us when we're at Inuvik, and  
29 I'll communicate with the participants about those.

30 That's all I have, sir.



1 MR. MARSHALL: Mr. Commis-  
2 sioner, I wonder if the Court reporters might be good  
3 enough to type that list of reports separately on a  
4 separate sheet?

5 MR. SCOTT: Well look --

6 THE COMMISSIONER: Have you  
7 got a list you can photostat?

8 MR. SCOTT: -- we can have  
9 photocopied or you can have photocopied the memo  
10 from which I've just read.

11 MR. MARSHALL: I can do anything.

12 MR. SCOTT: I'm glad Mr. Marshall  
13 is getting this because there will be a test on these  
14 at Inuvik the first week.

15 MR. HOLLINGWORTH: Mr. Commis-  
16 sioner, I have a point that arises out of proceedings  
17 of the National Energy Board. It seems to me it's of  
18 sufficient importance to justify some sort of response  
19 from Arctic Gas, and that's this, that Mr. Kalen, who  
20 was testifying for Panhandle Eastern on January 13th  
21 was being questioned as to when throughput could be  
22 expected from Alaska, and stated that:

23 "With an accelerated construction plan, we  
24 might be able to make 1981."

25 And I just would like to have details as to when we  
26 can expect details of this accelerated construction plan  
27 from Arctic Gas.



Calef, Lent, Bergerud  
In chief

MR. ANTHONY: Mr. Commissioner,  
I would like to then proceed with the evidence being  
called by the Canadian Arctic Resources Committee for  
your consideration on caribou and I'd ask Dr. Calef,  
Dr. Lent and Dr. Bergerud to take the stand and I  
believe that Dr. Bergerud has to be sworn.

ARTHUR THOMPSON BERGERUD, sworn,  
GEORGE WALLER CALEF, resumed,  
PETER CHARLES LENT, resumed:

MR. ANTHONY: While the  
panel is taking its place, I will bring to your --  
recall to you and to this Inquiry that the panel on  
caribou was commenced in December with Dr. Calef and  
Dr. Lent. I indicated to the participants at that  
time that we wanted to obtain Dr. Bergerud, but he  
was in the field doing caribou research at the time and  
that if it would be at all possible for him to attend  
when the panel returned that we would ask him to appear  
and give us the benefit of his comments. In particular  
since his evidence had been quoted at some length by  
Mr. Jakimchuk, I thought what he would have to say would  
be of assistance to this Inquiry. I would suggest,  
therefore, that Dr. Bergerud's evidence in chief be  
presented first in order that all three or any of the  
three can be cross-examined as the participants wish.

THE COMMISSIONER: All right.  
Dr. Bergerud has been sworn?

MR. ANTHONY: I believe he  
has been sworn, Mr. Commissioner.

Q Dr. Bergerud, a statement





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of your experience and education was circulated with your statement of evidence and I would ask that you summarize your education and experience to this Inquiry.

WITNESS BERGERUD: I received my B.Sc. from Oregon State University in 1953, my masters was in 1961 at the University of Wisconsin on the reproduction of caribou in Newfoundland. In 1968 I received my PhD. from the University of British Columbia on the population dynamics of Newfoundland caribou.

My field experience, I started studying caribou in 1956 as a District Biologist in Newfoundland. In 1957 I was promoted to caribou biologist and was in charge of the caribou herds in Newfoundland and Labrador. In 1958 I became chief biologist with the responsibility for moose. In 1959, chief biologist, and I spent many years studying ptarmigan as well as continuing my caribou studies. In 1965 I became the Director of the Game Department in Newfoundland. I have studied caribou since 1956 in the provinces of -- or in the large areas of Newfoundland, Labrador, Quebec, Ontario. I have done a few studies, a little work in British Columbia and in Keewatin.

I have been a field man. I have been with caribou at calving time and thirteen years I have been with them during rut in ten years, but I call myself a population ecologist. I asked the question in my research of why populations rise and fall, what are the population dynamics of wild populations, and my research animals are caribou but



1 in addition I research grouse species: ptarmigan, blue  
2 grouse, and ruffed grouse.

3 Q And from 1969 and to the  
4 present you have been associated as a professor, an  
5 honorary associate professor at the University of  
6 Victoria?

7 A Yes, I taught for several  
8 years at the University, but now I devote my full time  
9 to research and just hold an honourary post at the  
10 University.

11 Q And you are the author of  
12 the various forty-odd publications that have been  
13 circulated with your biographical note?

14 A Yes, sir.

15 MR. ANTHONY: Mr. Commissioner,  
16 the statement of evidence, biographical note and the  
17 list of reports referred to and relied on will be  
18 given the next exhibit number, please.

19  
20 (QUALIFICATIONS, LIST OF REPORTS AND EVIDENCE OF DR.  
21 ARTHUR T. BERGERUD MARKED EXHIBIT 403)

22 MR. ANTHONY: Would you  
23 commence, Dr. Bergerud, please, with a --

24 THE COMMISSIONER: Excuse me,  
25 Miss Hutchinson is out. We will remind her when she  
26 comes back. Go ahead.

27 MR. ANTHONY: Dr. Bergerud  
28 would you begin then with a presentation on your  
29 general concerns.

30 A In the December 18th



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hearings Mr. Anthony spoke of having a panel of caribou  
experts with conflicting opinions here, and you, Mr.  
Commissioner, spoke of having a bear pit. I guess,  
perhaps, I could be the bear in the pit. I have  
conflicting views with most other caribou biologists.

I disagree with Dr. Geist in  
that it has been shown that the disturbance of caribou  
can affect birth rates. I disagree with Dr. Lent about  
the need of caribou for wilderness, that they cannot  
live near man if we permit. I disagree with Dr.  
Calef here and his view that we don't know much  
about caribou. I think that we know quite a bit. I  
disagree with Mr. Jakimchuk with his view that a  
coastal pipeline is preferred over an interior  
route for caribou. I am sure that I could disagree with  
Dr. Banfield if I could find a strong statement of  
his in the testimony with specifics relative to caribou.

I have not studied the  
Porcupine herd and I believe I have been called because  
of my experience with other herds.





1 My analysis of the fate of  
2 the Porcupine herd is based on my experience with other  
3 herds. I know that nothing upsets local biologists more  
4 than having an outside expert drop in with all the  
5 answers and depart quickly, probably coming up with  
6 hypotheses they had rejected long ago. So I didn't  
7 ask to come, I didn't volunteer. In fact I came from  
8 the warm climate of B.C. and I think I already know  
9 the fate of your caribou, I think that they're going to  
10 freeze to death.

11 Before proceeding I would  
12 like to state that I have made a few additional notes  
13 to my testimony, based on my readings in the INquiry  
14 office. I tried to catch up on the backlog, but it  
15 is a tremendous bunch of material to go through. So  
16 as to my prepared presentation, my general concern, I  
17 would like to state first doesn't relate directly to  
18 the caribou.

19 As a population ecologist and  
20 caribou biologist, I have been concerned about the  
21 current and planned economic development of the Arctic  
22 and the question of petroleum supplies at two levels.  
23 At one level I question the wisdom of the current rapid  
24 development of the north, tampering with largely  
25 virgin ecosystems and the continued over-exploitation  
26 of the non-renewable fossil fuels. I belong to the  
27 doom and gloom school of ecologists who believe that  
28 man's continued existence on this planet requires a  
29 drastic change in life style and preservation of our  
30 remaining ecosystems. Without zero population and



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1 and economic growth, our status and way of life is  
2 uncertain.

3 THE COMMISSIONER: I take  
4 it you mean zero economic growth.

5 A Zero economic growth, yes.

6 Debate should not be whether  
7 caribou will cross a pipeline, but whether we should  
8 be exploiting these natural systems at all; whether it  
9 would not be best for mankind to leave our northern  
10 fossil fuels as reserves to be used later when we have  
11 lowered our economic standard of living, learned how  
12 to conserve precious fuels and locked the internal  
13 combustion engine in the garage. However, the public  
14 and government will not yet face the unpleasant fact  
15 that our economic way of life must change and change soon.  
16 Thus, debates centre on smaller ecological aspects and  
17 ecologists wage rearguard, delaying battles to slow  
18 down the exploitation of our remaining natural eco-  
19 systems, hoping that we will have some left when man  
20 finally realizes his predicament.

21 At a second and a lower level,  
22 I have been concerned and asked about the effects of  
23 northern development on caribou populations. As a lover  
24 of wilderness and a believer in intact ecosystems, it  
25 is extremely difficult to be objective about questions  
26 relating to single species who are only parts of the  
27 ecosystem, but essential parts. However, caribou are  
28 a vital component to the system, and these are vital  
29 concerns. In fact, caribou are possibly the most influent  
30 herbivore in any ecosystem, since they travel widely



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1 and interact with many components. By definition they  
2 can be considered the animal that ties the ecosystem  
3 together. The Porcupine herd can remain healthy only  
4 in an intact ecosystem.

5 When we ask single species  
6 questions, for example, caribou versus pipeline, we  
7 oversimplify the problem and arrive at short-term,  
8 short-sighted answers.

9 As an example of how complex  
10 multi-species changes in the ecosystem can affect  
11 caribou, I would quote my current studies of four  
12 relic caribou herds. I might add here that a relic  
13 caribou herd is a small herd that is left behind as  
14 adjacent populations have gone extinct. The adjacent  
15 populations have not migrated and left the area; there  
16 was once a continuous area of caribou but caribou  
17 adjacent to these populations are extinct, so these are  
18 relics, left behind. I returned within the last month  
19 from four months in the field studying one of these  
20 herds. I researched the problem of why these relic  
21 populations survived whereas adjacent herds have gone  
22 extinct. Is it a question of range destruction, man's  
23 presence, predation, or disease? To date my hypothesis  
24 that the caribou declined because of major changes in  
25 the entire ecosystem has withstood disproof. In the  
26 herds I studied, settlement altered the flora; deer and  
27 moose increased because of floral changes, and possibly  
28 changes in snow depths; deer brought disease (the  
29 menigeal worm) to the caribou and the moose population  
30 allowed wolf numbers to increase. Thus the fine





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1 balance that existed in the pristine relationship  
2 between birth and predation deaths in the caribou  
3 population was upset and the herd declined. Relic cari-  
4 bou populations now exist only where they can escape  
5 from wolves and deer, on islands and in rugged topo-  
6 graphy.

7 MR. ANTHONY: Q What comments  
8 do you have on the research presented to this Inquiry  
9 by Arctic Gas?

10 A My major criticisms of  
11 the studies sponsored by Arctic Gas is that they appear  
12 to be mostly single species studies with little attempt  
13 at integration. Huge funds have been spent and much  
14 data gathered, but the pieces defy analysis. If the  
15 data could have been collected more uniformly and  
16 quantitatively, it might have been susceptible to  
17 systems analysis. The system ecologists at the  
18 University of British Columbia have made headway at  
19 unravelling some inter-actions within ecosystems.

20 Another criticism is that they  
21 have been directed only at the short-term impact of a  
22 buried gas pipeline on the flora and fauna. One can  
23 see why this has been done -- a buried gas pipeline has  
24 a minimum profile and mitigating arguments are less  
25 tenuous. But we must consider the long-term effects.  
26 A buried gas pipeline is, in my view, only the first  
27 step. Once economic penetration starts it accelerates  
28 and feeds on itself. We must make plans on the assump-  
29 tion that a buried gas pipeline will be followed by an  
30 overhead oil pipeline, then a highway will be built,



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1 then the public will insist on access, and now we are  
2 losing control. The ecosystem is in retreat.

3 I don't wish to be only  
4 critical. It is always easy to throw stones a  
5 posterior. Mr. Jakimchuk and his colleagues have  
6 gathered comprehensive data on the movement and  
7 distribution of the Porcupine herd, and also on its  
8 reaction to certain disturbances. I agree with Mr.  
9 Jakimchuk's conclusions that the Porcupine herd can  
10 withstand a short-term influence of a buried pipeline  
11 along the coastal route. I disagree with his view of  
12 the long-term effects because further development will  
13 follow the initial route chosen, and these impacts  
14 cannot be dismissed as he has, without comment.



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Q Would you describe the theoretical aspects of caribou research?

A There are some theoretical aspects that I would like to bring up especially in relation to Dr. Lent's testimony. Dr. Lent in his testimony before this Inquiry spoke of the Porcupine herd as a migratory barren ground caribou who require wilderness. I have been critical of the description of caribou as a wilderness animal. First, the word "wilderness" is loaded with human concepts and emotions that have no operational meaning for caribou. Caribou seek not wilderness, but their life requirements. Secondly, the word to many means that we cannot manage caribou, that we must leave them entirely alone. Again, many believe that caribou are wilderness animals because they frequent old-age lichen plant communities, however --

THE COMMISSIONER: What was that word you inserted? They frequent --

A Old-age.

THE COMMISSIONER: Old age.

A There is some debate whether such a thing as climax exists. However, there is much evidence that caribou can do quite well without these floras. Again, others feel these caribou have an inherent aversion to man and cannot live adjacent to man. I disagree, and have provided substantial evidence. Geist reaches the same conclusion for other ungulate species.

Caribou are wilderness species in two senses. First, they need vast areas of space,





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if the herds are large. They need this space to find the right mix of habitats relative to food, weather, insects and predators. Second, caribou are unwary to man (this unwariness, per se, indicates that they have no inherent aversion to man). This inherent susceptibility to hunting can result in overhunting. Caribou can occupy ranges with men, the question is whether men can live with caribou. Very likely they cannot. Man is the most unmanageable of all species. A history of wildlife management failures would include mostly the failures of men to abide by regulations and the success of "enlightened laymen" to override the decisions of professional biologists.

Dr. Lent has implied that the Alaskan migratory barren-ground caribou are possibly a different kind of animal than the caribou I studied in Newfoundland. It is my view that all discrete caribou gene-pools, that there are differences in physiological, morphological, and behavioural adaptations to the extrinsic environment. The words "migratory", "woodland caribou", "mountain caribou", and "barren-ground caribou" have no real operational meaning. I have studied the so-called "woodland caribou" in Newfoundland and they behave quite similar to the "barren-ground" animals in Alaska as described by Skoog. The behaviour of the "woodland" caribou in Newfoundland hardly resembles the behaviour of the "woodland" caribou that I am now studying in Ontario. I have argued that caribou are highly adapted and adaptable to their environment. As the environments of different caribou populations are similar, so will be their adaptive responses. A



Synthesis is then possible if the environmental components are understood. There is one exception: it can be highly misleading to extrapolate from domestic reindeer to caribou even though their habitats are similar. Reindeer have been bred for docility, productivity, protein and sedentariness and have lost their habitat traditions. It can be misleading to study these animals for an understanding of disturbance behaviour.

Q What is your view of the issue of natural regulation of caribou numbers?

A This have been my area of specialty for many years and I have argued that numbers of caribou in various herds in North America is determined by a fine balance between birth rates and death rates. Birth rates are relatively constant in many herds at about 80 to 85 per 100 adult females. I would like to add an additional note here based on my reading of testimony Monday giving me an opportunity to disagree with Dr. Banfield. On page 14263 Dr. Banfield indicated that a fertility percentage of 75% is extremely high for caribou. There are a few wild populations that normally have a pregnancy percentage this low, Mr. Commissioner. In nearly all herds, pregnancy, and/or birthrates are 80% and higher for adult females. The pregnancy rate for the Porcupine herd is not known, a major deficiency. The birth rate, and birthrate and pregnancy rate need not be synonymous, the birthrate has been approximately determined in only one year for the Porcupine herd and that was in 1972 by Dr. Calef. He reported 50



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calves per hundred females and yearlings in mid-June.  
This is a low, low calf per female ratio, even when  
corrected for yearlings. Since Calef saw aberrant births,  
brucellosis is a possibility for the  
Porcupine herd --

THE COMMISSIONER: What is  
the possibility? I am sorry, what did you say?

A Aberrant?

MR. ANTHONY: I think that  
the word was brucellosis.

A Brucellosis is a  
disease that is endemic in buffalo and it appears to  
be in the Arctic caribou herd and causes loss of  
fetus or stillbirths. Lent reported it from the  
Arctic herd, which is adjacent to the Porcupine, thus  
all may not be well with the production of the Porcupine  
herd, and this is contrary to the reports of the  
Renewable Resource people.

The chief mortality of the  
herds to balance the low reproductive rate of caribou  
is human and natural predation. Recently, Calef  
documented that the density of the Porcupine herd when  
all the range was considered, was about one caribou  
per square mile. Several other large herds in North  
America had similar low densities. Such low and consis-  
tent densities between herds is consistent with  
my view that predation and not range and food regulates  
or limits the numbers of caribou. The food resources  
of these herds must vary and could support much higher  
densities. However, one caribou per square mile fits





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nicely with a density of one wolf per 50 to 100  
square miles which is about the number of predators  
required to stabilize the numbers of caribou at one per  
square mile.

Further, several herds with few  
or no predators have exceeded one caribou per square mile.  
The Nelchina Herd in Alaska reached a density of over  
five caribou per square mile when wolf numbers were  
low. I am currently studying a relic population on  
the Slate Islands in Lake Superior that has no predators  
and has a density of fifteen per square mile. In-  
cidentally, this herd has maintained this density since  
at least 1945 in an environment almost devoid of any  
substantial lichen supplies. Another herd that I  
studied in Newfoundland on Brunette Island also reached  
a high density in the absence of lynx.



1                                    It's the predator that is  
2                    in Newfoundland  
3                    important. The very limited demographic data gathered  
4                    in the studies of the Porcupine herd supports the  
5                    view that predation <sup>can</sup> limit the growth of the Porcupine  
6                    herd. There is an estimated 300 to 400 wolves in the  
7                    Yukon section of the herd and possibly another 400  
8                    wolves in Alaska. These animals could take 6, 000 to  
9                    8,000 animals annually, not considering the young calves.  
0                    Calef estimated that the human kill of the Porcupine  
1                    herd would be between 2,500 to 4,000 animals annually.  
2                    He also indicated a yearling percentage in one year of  
3                    9% or about 10,000 animals. I changed it from eight  
4                    to ten because Dr. Calef says that I should consider the  
5                    best estimation of the herd at 110,000 animals. The  
6                    9% figure is similar to statistics from other herds  
7                    and suggests a stable or decreasing population. Thus  
8                    I disagree with Calef that the population will increase  
9                    slowly. The population now appears to be in a balance  
0                    with its environment. We can upset the status of this  
1                    herd by altering the inter-actions between wolves and  
2                    caribou. If development gives wolves an advantage,  
3                    especially on the calving grounds, deaths could exceed  
4                    births and the population decline.

A I disagree with Mr. Jakimchuk's conclusion before this Inquiry that the weakest link in the biology of the Porcupine herd is during migration. I believe the weakest link is



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1 during the calving season and during insect attacks  
2 in the summer.

3 If a buried gas pipeline was  
4 built along the coastal plain and this was followed by  
5 an elevated oil pipeline and a road, these combinations  
6 might seriously affect the Porcupine herd. Such a  
7 route would pass through the calving grounds and post-  
8 calving habitat used for relief from insects.

9 Calving grounds appear to be  
10 key pieces of habitat for caribou. We identify differ-  
11 ent herds based on discrete calving grounds. The  
12 tradition to use these areas seems the most consistent  
13 of the habitat traditions. I feel that this tradition  
14 has been developed because these habitats provide the  
15 best escape advantage for young calves from wolves,  
16 and thus this has a phylogenetic basis not liable to  
17 rapid modification. Caribou are more sensitive to dis-  
18 turbance when they have young calves than at any other  
19 season. Females require a period of sedentariness to  
20 learn to recognize their calves. Females with young  
21 calves have long flight distances. When herds are  
22 disturbed, females and young frequently get separated.  
23 A helicopter flying low across the calving grounds be-  
24 cause of fog would be the most disturbing of all aerial  
25 flights for caribou, and I understand fog is common  
26 along the coast.

27 At calving time, caribou are  
28 more vulnerable to predation than at any other season.  
29 Further, the herd structure at this time may have an  
30 antipredator function and splintering of groups is not





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1     advisable.     Calving grounds may be key real estate in the  
2     adaptive race between escape and predation in the  
3     caribou-wolf inter-action.     Second best habitat may  
4     not be good enough.

5                     Caribou populations that calve  
6     about June 12th are susceptible to wind chill mortality,  
7     whereas caribou herds that calve about May 28th are  
8     not.

9                     Since the Porcupine herd calves  
10    about June 7th, wind chill mortality may occur.     Note  
11    that Jakimchuk reported calves per 100 cows in the  
12    first half of July as 48 in 1972, 47 calves per 100 in  
13    1973, and 66 in 1974.     These statistics suggested that  
14    1974 differed from '72 and '73.     These July counts  
15    likely don't reflect birth rates, but variances in calf  
16    survival.     Calves disturbed in nursing or separated  
17    from their dams would be quite liable to wind chill  
18    mortality.

19                    The post-calving aggregation  
20    of nearly all the Porcupine herd in a few square miles  
21    (50,000 animals in one square mile) must be one of the  
22    great remaining marvels of this world, must be equal  
23    to the flights of the passenger pigeons and massing of  
24    buffalo.     Such sights, or even knowledge thereof,  
25    add perspective to our lives, a tonic and a humbling  
26    experience.     Surely we must avoid possible conflict with  
27    this assemblage.

28                    Child's studies in Alaska  
29    suggested that an elevated pipeline intersecting the  
30    post-calving aggregation would act as a barrier, at



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1 least initially. Individual initiative in crossing  
2 at this time is hindered by the presence of small calves  
3 and social facilitation. I have removed fly harassment  
4 here, Mr. Commissioner, from a misunderstanding of  
5 Child's work.

6 The huge herds are the least  
7 likely of any caribou aggregation to cross over or  
8 under an elevated line. Again the movement of these  
9 herds, these post-calving movements, would intersect  
10 the coastal line at angles of less than 45 degrees,  
11 and movement could be deflected.

12 In each of the years 1972 to  
13 '75 , the post-calving aggregation has formed at Camden  
14 Bay. I think the animals gather there because the coast  
15 provides a brief, one to two-week respite from insects  
16 relative to other habitats. Some bulls and yearlings  
17 travel long distances to reach this site. The Renew-  
18 able Resources Consulting Services should have quantified  
19 insect abundance between the coast and the interior .  
20 to test this hypothesis.

21 I realize that insect phenology  
22 varied between years whereas the timing and location  
23 of the post-calving aggregation did not. I have argued  
24 that the fall migration is an anticipatory type of  
25 movement that may be inappropriately timed in some  
26 years. The same may hold for the post-calving movement.

27 If animals seek this area for  
28 insect relief this is indeed important habitat. Caribou  
29 are tormented by insects for over a month in the Arctic  
30 and their nutritional status is taxed. One or two



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1 additional weeks of relief is not to be scoffed at.

2                   The habitat around Cam\_den Bay  
3 which is north of the proposed gas coastal route, may  
4 be the most essential of all the range the Porcupine  
5 herd travels. The burden of proof of this lies with  
6 those who believe otherwise. The possibility of key  
7 importance does not permit guessing in my view.

8                   Q     What is your evaluation of  
9 the potential impact on caribou along the interior  
10 route?

11                  A     These remarks of mine  
12 are directed at an elevated pipeline. I believe an  
13 elevated pipeline along the interior route could be  
14 successfully navigated by caribou. I might say since  
15 an elevated pipeline is probably more serious than a  
16 buried pipeline, that these remarks also would apply  
17 to a buried pipeline in some contexes.

18                  The advantages of having a  
19 line along the interior route over the coastal route are:

20 1. The animals would usually encounter the pipeline  
21 on migration. The tradition to return to specific  
22 calving grounds and to specific winter ranges are two of  
23 the strongest drives caribou possess, and they are the  
24 least likely to be deterred.

25 2. The animals would usually strike the pipeline at  
26 angles greater than 45 degrees and hence are unlikely  
27 to make long lateral shifts.

28 3. In these migrations the animals are usually moving  
29 single file (not massed as they often are in July)  
30 with the best crossers at the front. Once these lead





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1 animals cross the pipeline, the rest will follow,  
2 unless a disturbance occurs.

3 4. With the interior route, the animals would encounter  
4 the pipeline more often in areas with some tree cover.  
5 The pipeline would blend better with the landscape than  
6 on the tundra along the prime route. Further, indiv-  
7 idual initiative would be stronger in such habitats  
8 than on the tundra.

9 5. Animals may be more prone to pass beneath a  
10 line in some forest cover.



Most important, snow cover present, this snow can be used to provide highways of compacted snow to lead animals to underpasses or overpasses. If the migrating animals are off course, their direction could be altered by snowmobile trails. The use of the kutchin fences by natives to capture caribou indicate that drift fences will be effective in channeling caribou to crossings.

The studies in Alaska by Child are not adequate to decide between the relative merits of overpasses versus underpasses for migrating caribou striking an elevated line in some forested cover. Possibly animals will go under so long as segments of the line could be elevated to the desired height. The behaviour of wild caribou in navigating pipelines in the U.S.S.R. is not adequately understood and biologists should visit these pipelines.

Further mock pipelines will have to be tested as Child did in Alaska at the proposed migratory crossings. Expenditures need not be excessive. The use of snow fences and snowmobile trails could bring large numbers of animals against a small section of line.

The following hypotheses should be tested:

- 1) that animals are most likely to first cross in spring than in fall migration (therefore pipeline constructed in the winter).
- 2) a light coloured line, perhaps a camouflaged line is preferred to dark colour.
- 3) lines should be built to avoid noise and motion.



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4) the propensity to cross is, in part, a reflection of how well the other side is viewed and how contrasting the line is against adjacent habitat. This latter affects how close the animals can approach the line so as to see the other side.

Aerial disturbance of animals would not be serious along the Interior Route during construction and later with maintenance, in my view. Flights could usually remain above 1,000 feet since the weather is more continental than along the north coast. Caribou in the winter and when migrating habituate <sup>to</sup> aircraft flights that do not relate to their well-being. I have had experience with caribou, flying over caribou in five different herds. Caribou biologists probably disturb caribou more than any other group of people. I know that I have certainly harassed many herds. The aerial surveys conducted by the Renewable Resource Consulting Services have likely disturbed the animals more than will the flights connected with the construction and maintenance of the pipeline.

Q Could we now have your general comments on disturbance of caribou no matter what routes are particularly followed?

A There is no evidence that aerial harassment in the winter can affect the birthrate of caribou. The birthrate has remained remarkably constant for those herds that have been studied: the Kaminuriak, the Nelchina, the Beverly and the Newfoundland Herds. I repeatedly harassed several populations of the Newfoundland during a ten year





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study. The consistency in birth rate between herds and between years is remarkable in view of the great extremes in winter nutrition both between areas and years. In one winter Newfoundland caribou lost 26% of their weight, but productivity remained high. I feel it is not valid to extrapolate from domestic reindeer to wild caribou in this regard, and as Geist does. Would one use the findings on the productivity of domestic sheep to evaluate the role of the environment on the productivity of Mountain Sheep?

I disagree with Dr. Lent's brief before this Inquiry that caribou will abandon ranges bisected by human arteries across migration routes because of an inherent aversion to man -- a "wilderness" animal. In a cause and effect argument, one need only provide one example of a "supposed cause" present (human activity) and a "supposed effect" not present (no caribou decline) to show that the cause is not sufficient. I have presented examples elsewhere of caribou accommodating themselves to the presence of man. I am presently studying a little relic herd of caribou, 22 animals, that winter annually on an airstrip near the town of Armstrong, Ontario. Last winter the animals fed in the junk yard adjacent to the airstrip. The wrecked automobile bodies provided air vents through the snow down which the caribou could scent blueberry plants and lichens. These animals paid little heed to the comings and goings of aircraft. They wintered on the airstrip because D.O.T. had cleared the trees from the ends of the runways which had resulted in



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increased lichens.

For a cause to not be necessary one need only show one example of the "supposed effect present" (abandonment or decline of caribou) but the "supposed cause" absent (no human activity). There is much evidence of such abandonment of ranges. In fact, these range shifts are a way of life for caribou and is how they adapt to changes in the extrinsic environment. We must be aware of the fallacy of that which follows is due to antecedent events.

Further, many traditions to various ranges have been lost, not because of aversion to man, but because the animals with the traditions were killed. Again, I would like to digress, based on my readings, at about page 14937 Mr. Jakimchuk and Banfield were cross-examined on the decline of other herds in North America after a human disturbance was created. I have personally studied three of these four herds and would like to comment. The first herd that was mentioned was that in Newfoundland, that was said to have declined after a railroad was built. I studied this herd for my PhD. thesis, and this is my story.

In the 1800's the native Indians in Newfoundland, the Beothics were exterminated and the wolf population was reduced to the verge of extinction. As a result, I believe, the Newfoundland population erupted, increased, and was at the high of 40,000 animals in 1900. A railroad was built across the range. Each year several hundred hunters



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1 gathered at the crossing and shot several thousand  
2 animals. I documented in my thesis that this kill,  
3 plus calf crop failures due to lynx predation  
4 probably caused the decline of the herd to 2,000 animals  
5 in fifteen years.

6 Incidentally, now that the  
7 Newfoundland herds are now increasing, animals are  
8 starting to use the old crossing places, even though  
9 all the animals to pass on the tradition are long gone.

10 Another herd mentioned in  
11 cross-examination was the Ungava herd, A railroad  
12 was built near Knob Lake or Schefferville  
13 back in the forties. When Dr. Banfield counted the  
14 herd in the early fifties he estimated only 5,500  
15 animals. I believe he grossly underestimated the herd.  
16 I counted the herd in the early sixties and thought  
17 there was 15,000, and I must have underestimated, since  
18 the natives were killing more animals than a herd of  
19 this size could support. Now, the herd in Ungava  
20 numbers 90,000 animals. Early counts were no doubt in  
21 error, sir, but there is also no doubt that the herd  
22 has increased. Another indication of this increase  
23 is that the wolves have come back in Ungava. This  
24 herd resulted even though there was a railroad built.

25 The third herd mentioned in  
26 the Bayly - Banfield exchange was the Kaminuriak herd  
27 that used to cross the Churchill-Pas Railroad.  
28 This railroad was built in the twenties and the animals  
29 made crossing some 25 years later. Parker has provided  
30 historical evidence that the herd was high in numbers in





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the years that they crossed. Earlier in the century they were at lower numbers, similar to now and did not go as far south as the site where the railroad was later built. If numbers again increase, they may cross again. There is no evidence to say that the railroad caused a decline. Too often we equate changes in distribution with changes in numbers. A population can only decline if the disturbance reduces birthrates or death rates and this has not been documented.

Lastly, the 40-Mile herd was mentioned. I have not studied this herd, but we should note that Weedon stated that the Steese Highway was built in 1928 and the herd did not decline until 35 years later. Skoog's threshold density hypothesis predicted that this herd should have declined and this hypothesis was not related to manmade disturbance. We have very few predictive hypotheses in wildlife biology and it bothers me that when one of our hypotheses really predicts, we immediately search for other hypotheses to explain the decline. The Porcupine herd may well decline if the pipeline is built. It is the fate of caribou herds -- I would like to rephrase that -- Porcupine may well decline if or if not the pipeline is built. It is the fate of caribou herds to rise and fall, for sub-populations to exchange animals. The pipeline will be blamed for such a decline as sure as we are sitting here, be it five, ten or fifteen years later. If the builders want to avoid this blame, they will have to continue their studies for many years and greatly sophisticate their knowledge of the demography



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1 of caribou and wolves to get off the hook for any  
2 subsequent blame.

3  
4 I would like to return to  
5 page 16.  
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Geist, 1971, argues that if human activity has no meaning for ungulates, they will accommodate to man's activity. Animals should not be harassed or driven from the road by motorists. In fact, caribou must have the right-of-way on roads over traffic, or the roads be closed at crossing times, if we do not kill leading animals, if we do not harass them, caribou can accommodate to motor traffic similar to the way that antelope have accustomed themselves to super highways through sagebrush ranges.

If caribou again increase in Alaska to the numbers reported by Murie in the 1920's, I suspect one might even see caribou outside the University near Fairbanks. A great deal of where caribou are depends on how many there are. When numbers decline, movement slackens and hence roads are less likely to be encountered.

We can expect that a pipeline built along the interior route through winter ranges will alter caribou-wolf inter-actions. Wolves will change their hunting tactics and be able to use winter roads to ambush caribou and drive them into deep snow. Banfield has mentioned this sequence.

Two examples from my own work may help illustrate this point. In December, 1973, I was studying caribou in the mountains of British Columbia. A wolf pack was hunting moose travelling frozen lakes in the valleys. The caribou were using the wind-swept mountainsides for foraging and were isolated from the wolves by a barrier of four miles of





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soft snow. I snow-shoed from the moose habitat across the four-mile barrier to the caribou range. That night the wolves left the valley, followed my trail of compacted snow, and found the caribou herd. I <sup>had</sup> completely changed the hunting pattern and escape advantage that caribou had had for perhaps four weeks.

In February, 1973 and 1974, I studied a relic population of 19 caribou living in the rugged topography adjacent to Lake Superior near Marathon, Ontario. Again wolves were hunting moose following routes of least resistance along frozen rivers flowing into Lake Superior. There was little lateral movement into the caribou habitat. Now a hiking trail is being made along the shore through the escape habitat of the caribou, and already the wolves have used this trail.

The alteration of caribou-wolf inter-actions by winter roads is real since I feel that natural predation can limit caribou populations. We need to investigate the effects of development on wolf abundance and behaviour. Also we have no baseline data to evaluate predation post-development. Predation losses have not been quantified. There is little data in the Renewable Resources Consulting Services on the topography and movement of wolves. These are major deficiencies since wolves are the major predator in this ecosystem. We can expect subtle alterations in the flora-herbivore-predator food chain with development and these may be more serious than the man versus one species considerations in the



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1 long term of time.

2 Q What issues do you feel  
3 need be addressed in considering the future management  
4 of caribou herds?

5 A The studies of the Porcu-  
6 pine herd to date have dealt mostly with the distribu-  
7 tion and movement. These studies will have to continue.  
8 Skoog documen ted major shifts between caribou herds in  
9 Alaska. Recently the 40-mile and the Nelchina herd have  
10 undergone major declines, as predicted by Skoog in  
11 his 1968 work. Nobody has documented where these ani-  
12 mals have gone. An explanation of starvation cannot  
13 be accepted unless the bodies have been found. It is  
14 difficult to imagine overlooking 50,000 bodies in 12,000  
15 square miles for the Nelchina herd. If the Porcupine  
16 herd reaches high densities major shifts to other herds  
17 can be expected.

18 The current studies have hardly  
19 touched vital research and management considerations of  
20 the demography of wolf and caribou. Much remains to be  
21 done. The following statistics need to be gathered  
22 each year.

23 1. Status of the herd. The post-calving aggregation  
24 must be counted each year and the composition determined.  
25 Corrections are needed for under-represented sex and  
26 age classes.

27 2. The birth rate of the herd should be determined each  
28 year. This is best accomplished by wildlife officers  
29 being stationed in Arctic Village and Old Crow. These  
30 officers would accompany hunters and determine pregnancy



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percentages.

3. The age structure must be determined annually.

Native hunters could be paid to bring in the lower jaw-bones of harvested animals.

4. The percentage of calves in the herd in October and March should be determined.

5. The status of the wolf population should be assessed.

Further research should concentrate on calf mortality (calving ground studies) and the biology of wolves.

Future management will require some international agreements. If the Federal Government was responsible for the herd, we could expect better expertise than if the Territories were the sole administrators. Any treaty between Canada and the United States should include safeguards for the habitat. Canada should be required to match Alaska in setting aside habitat for the preservation of the Porcupine herd. Such a refuge or National Park might join the Arctic International Wildlife Range in Alaska. The treaty should include safeguards for the hunting rights of natives that now hunt the animals.

However, these natives should be required to hunt the animals as they now do, and not be allowed to take advantage of the new roads. An increase of hunting because of new roads could mean a decline in the herd if births and deaths are now in balance. Such increased hunting could only occur if wolves are reduced, and this is a major alteration in





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the ecosystem with many ramifications. If such hunting were permitted, it would have to be carefully regulated to prevent the loss of habitat traditions through mortality and/or harassment.

Lastly, we need to stop our tampering with natural forest fires in the north. There is now evidence from three caribou studies that forest fires benefit food supplies for caribou, and both tundra and forest dwelling populations. A great deal of work has been done by plant ecologists on the natural role of forest fires in northern ecosystems. These studies support the natural role of fires in maintaining<sup>the</sup> vigor and complexity of northern ecosystems. Smoky the Bear is now on the run in the National Park service, let's get him out of the north.

If these and other recommendations are accepted, we may enhance the possibility that we will still have some caribou in our world when, and if we get our own population and economic growth in balance with the sustaining resources of the earth.

MR. ANTHONY: Thank you, Dr. Bergerud. I'm pleased that you've been forced to appear before us.

Mr. Commissioner, I think we can, in light of the evidence that's been presented, I think we can anticipate that the first questions by the participants may very well be to get some focus or clarification of the difference between the panelists who are appearing together, and I wonder if it might assist the other participants and yourself,



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1 sir, if I have Dr. Lent and perhaps Dr. Calef, if they  
2 wish to comment briefly just on the differences that  
3 have come out on Dr. Bergerud's evidence in order that  
4 the other participants can then focus on these differences  
5 and ask whatever questions they feel will serve the  
6 interests of the Inquiry?

7 THE COMMISSIONER: Good idea.

8 MR. ANTHONY; Dr. Lent or  
9 Mr. Calef? Dr. Lent.

10 WITNESS LENT: Well, I might  
11 start on a positive note by noting that we do have  
12 some agreement, particularly we all, that is all three  
13 of us, seem to agree with regard to the coastal route  
14 as being the most unfavorable, having the most potential  
15 for an unfavorable impact on caribou -- on the Porcupine  
16 caribou herd in particular, and I believe I can honestly  
17 say that all three of us reached that conclusion in  
18 somewhat different directions, and quite independently.

19 Now the subject of wilderness  
20 has come up in my testimony and in Dr. Bergerud's, and  
21 certainly yesterday. I would like to make some remarks  
22 about what I meant when I referred to caribou as wilder-  
23 ness animals or wilderness species. But before I do  
24 that I think it might be helpful not only in this  
25 regard but in the context of some of the floundering  
26 around that went on yesterday to read a definition of  
27 wilderness. This definition is one established in  
28 the United States for legal purposes, that is as part of  
29 the Wilderness Act of the U.S. Congress,  
30



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I'd like to quote at least  
part of this definition,

"A wilderness, in contrast with those areas  
where man and his own works dominate the land-  
scape, is hereby recognized as an area where  
the earth and its community of life are untram-  
melled by man, where man himself is a visitor  
who does not remain. An area wilderness is  
further defined to mean in this Act an area  
of undeveloped federal land retaining its  
primeval character and influence without  
permanent improvements or human habitation  
which is protected and managed so as to  
preserve its natural conditions."

Then the definition continues, but I think that is the  
essence of it, and I'd like to emphasize the last part,  
that within certain restrictions, which are established  
elsewhere in this Act, it is possible to manage wilder-  
ness areas to preserve their natural conditions. There-  
fore it is possible within a wilderness area to manage  
caribou, that is they may be hunted and restrictions and  
regulations can be developed to carry out that hunting  
and harvesting.

Now, what do I mean when I  
say "caribou are wilderness animals"? I did not say  
that they have an aversion for man. What I did mean  
was that large migratory populations of caribou are  
unable to sustain their natural balance with the  
environment when this environment is substantially  
altered by human activities and human land use practice





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1 In fact I believe Dr. Bergerud has presented some  
2 examples where this has occurred, particularly on pages  
3 2 and 3 of his prepared testimony, dealing with Ontario  
4 where we had habitat changes brought about by human  
5 alterations of the environment, and in this case they  
6 have resulted in decline of caribou, remaining relic  
7 populations, increase in other herbivores in that  
8 particular case white-tailed deer and moose. We have  
9 had a similar occurrence on the Kenai Peninsula of  
10 Alaska where the native caribou population was entirely  
11 extirpated at about the end of the last century and  
12 the moose population, moose having been almost complete-  
13 ly absent from the area, so far as we know, the moose  
14 population rapidly increased in the area of the Kenai  
15 Peninsula, increased in numbers and also produced some  
16 of the largest moose in the world, leading to the  
17 establishment of the Kenai National Moose Range, which  
18 in a sense was established to protect a situation which  
19 developed artificially due to man's activities.

20 Now, one area which we have  
21 talked about in the life cycle of the caribou is the  
22 calving grounds, and certainly in Alaska every population  
23 major or relic, existing in that state today, has a  
24 calving grounds which lies essentially in wilderness  
25 or wild land areas. There are no calving grounds in  
26 Alaska, insofar as I know in the mainland of Canada  
27 which are adjacent to human habitation or which make  
28 significant use of habitat altered by man.

29 Now I'd like to then write down  
30 my reasons why I refer to caribou as wilderness animals



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into three categories:

First of all, the one I've been talking about already is the effects of loss of habitat in terms of both quantity and quality due to man's activities and effects.

Secondly and closely related to that is the decrease in the ability of caribou to make efficient use of their available habitat due to man's activities and man's construction. In other words, the migratory behaviour of large caribou populations is presumably adaptive and therefore anything which interferes with this migratory behaviour is likely to be deleterious.

Thirdly, their very unwariness and not their aversion is one of the reasons I refer to caribou as wilderness species, and in fact they are quite analogous in this sense to the passenger pigeon and to the bison to which Dr. Bergerud just referred.

This unwariness, plus their use of open habitat and their tendency to aggregate in large numbers makes their management and regulation of hunting extremely difficult, and I would agree with Dr. Bergerud that for at least many populations hunting has been a major factor in their decline. But we simply have to face the fact that management of caribou in terms of hunting regulations is extremely difficult. I would not lay all the blame on laymen and the general public. I think that professional biologists have had their problems in regulating harvest of caribou, which have not been brought about entirely by public disregard of regulations or apathy.

Again on page 18 of this



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1 prepared testimony, Dr. Bergerud refers to the possible  
2 unfavorable effects of subtle changes in flora-herbivore  
3 predator food chains, and again this is the same type of  
4 effect which I am referring to.

5 Now I don't wish to get into  
6 the lichen forest fire controversy to any great extent.  
7 I believe I agree with Dr. Bergerud that there has been  
8 for some time perhaps over-emphasis on this aspect of  
9 caribou biology, and the effects of forest fires and  
10 destruction of lichen on caribou populations. It is  
11 quite true that some caribou and reindeer populations  
12 or segments of populations can and do subsist on winter  
13 ranges where lichens are not a significant component.  
14 However, looking overall, throughout the northern  
15 hemisphere I think it could be clearly established that  
16 the majority of reindeer and caribou populations utilize  
17 lichens as the major complement of their winter diet.

18 In short, the pendulum had  
19 swung to one extreme of over-emphasis on so-called  
20 climax lichen ranges and protection of habitat in  
21 terms of preventing forest fires, I would hate to see  
22 the pendulum now swing to the other extreme where we  
23 ignore the known importance of lichens to most caribou  
24 populations.

25 Now I want to refer to Dr.  
26 Bergerud's remarks about the applicability of reindeer  
27 studies to caribou biology and caribou management  
28 problems. I believe the analogy which he gave, that  
29 being the comparison of domestic sheep to wild mountain  
30 sheep populations is a rather misleading one because I





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1 believe that the biological differences between domestic  
2 reindeer and caribou are far fewer and a far lesser  
3 degree than that between domestic sheep and mountain  
4 -- wild mountain sheep.

5 As a few examples to illustrate  
6 what I'm getting at, I might mention first of all that  
7 the wild reindeer of Norway, for example, are indeed  
8 feral reindeer which at one time were domestic stock.  
9 Studies of the behaviour, the reproductive biology and  
10 the population dynamics of these feral or wild reindeer  
11 in Norway has indicated that in all these aspects they  
12 are very similar to those of caribou migratory --  
13 large migratory populations of caribou in North America  
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In Alaska,

similarly, we have had domestic reindeer go feral in several parts of the state. Some of these reindeer have entered into or been absorbed by migratory caribou populations, particularly the Arctic herd which I have studied. These formally domesticated reindeer from Siberia have been able to survive in these caribou populations. They have been able to reproduce in these caribou populations. I frankly cannot imagine domestic sheep doing the same in the Dall sheep population.

Studies are underway with both reindeer, co-ordinated studies with both reindeer and caribou in Alaska, looking at nutrition and physiology and the biologists at the University of Alaska who have been carrying out these studies have had no indications to date that information gained with reindeer is not applicable to their caribou studies and vice versa.

In our own studies, the studies which are described in my prepared testimony dealing with the responses of both caribou and reindeer to simulated pipelines, we found no significant differences in behavioural responses between caribou and the reindeer on the Seward Peninsula which could not be related to either differences in group size, seasonal variations and the times of the studies, or other environmental factors.

All this is not to say that there are not differences of behavioural and perhaps physiological nature, but I think that the level of the



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state of the art that we are at now, these differences are generally not too significant. We can approach it with care, but I think that most of the results which Dr. Geist has referred to <sup>from</sup> Soviet studies are generally applicable to caribou management.

That leads me to the subject of harassment. I would agree, strongly agree that biologists have been agents of harassment on caribou populations and in fact, in view of the low birthrates and low recruitment seen in the Porcupine caribou herd in 1972, I would suggest that this, and that, by the way, I should add was the peak year for biologists in northeastern Alaska and the Yukon Territory, I certainly believe that this subject is worthy of further investigation.

THE COMMISSIONER: By an examination of the data.

A Further experiments, -- quite.

It is true of caribou, and it is true of domestic reindeer that they generally either have weight stasis or lose weight in the wintertime again, a similiarity between the two.

THE COMMISSIONER: Sorry, what was the weight, what?

A Stasis, in other words, they either maintain their weight in the wintertime, do not gain weight, or more commonly, they actually lose weight in the wintertime as Dr. Bergerud has mentioned in his testimony. However, I think the





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emphasis again, as I have said in my own testimony on the effects of harassment, needs to be placed on summer - - on the summer season, and again I also brought out in my own testimony that the work presently under way at Prudhoe Bay with both reindeer and caribou has indicated that there is a very short season for a positive energy balance, in short, for weight gain, and that this is a critical season, and I think that Dr. Bergerud has also alluded to this in his own testimony.

If caribou populations are in a sensitive state of balance with their environment, such as Dr. Bergerud has suggested, then I think we still cannot ignore the effects of harassment which again, as I have emphasized before, is an additive effect to those effects resulting from the natural environment.

Now, I want to turn to the subject of abandonment of range, and I certainly thoroughly agree that abandonment of ranges, shifts of ranges can be due to natural causes, and in fact I believe that I was one of the first to clearly point this out in my own dissertation<sup>and</sup> in a 1966 publication, and Dr. Bergerud has pointed out that these shifts in range use, these major shifts in range use and apparently shifts between sub-populations which Skoog and others have described, are adaptive, they have value in terms of caribou survival, and therefore we have to look very closely at any human activities which will prevent or hinder such shifts in range from occurring, and this is one of my major concerns with manmade developments



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such as roads or elevated pipelines.

Now, I have not suggested that a road, per se, has major adverse effects on caribou populations. Obviously it is the use of this road which counts and the fact that there was a trail of sorts in 1928, which we now refer to as the Steese Highway, is not particularly valuable information. What we need to know is what use was made of that road and in my previous testimony I stated that after the second world war the use of this highway increased greatly, particularly for hunting purposes and for general tourism. So, obviously, it is not the road, per se, but the activities and the land use changes associated with these roads which are critical and ideally, in theory, perhaps we could regulate human activities in such a way that roads would not have adverse effects, but I believe to date we have been unable to do so and I submit that I am a pessimist and I doubt if we will be able to do so in the future.

I believe that that is all the comments that I have.

MR. ANTHONY: Dr. Calef, did you wish to comment?

WITNESS CALEF: Yes I just have a few short comments. Dr. Bergerud said that I had called the Porcupine caribou herd an increasing population. I think that I have written three reports on the Porcupine herd. I think in my final report I said that it would probably increase very slowly. In one of my previous reports I said that I thought that the



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population was stable, or very slowly increasing. I agree with him that it is very close to stability and perhaps the present rate of increase or decrease is less than our ability to measure it. My reasons for saying that I believe it will very slowly increase is that its density is still lower than the population density of the Arctic herd which is in similar habitat in Alaska. To reach this density the Porcupine herd would have to increase by, say, another 50 to 70,000 animals and the Bluenose herd, which is also the nearest herd to the Porcupine herd on the east, is also increasing.

The second thing is, I hope that I didn't leave the impression that we know nothing about caribou and their behaviour and so on. The major weaknesses that I wanted to point out in our knowledge of caribou is that in virtually no herds do we have a long-term balancing of population input and output, that is to say, births and deaths, particularly in a population which is in a decline phase. I think I said that there were two exceptions to this weakness. One is Dr. Bergerud's study in Newfoundland in which he has very detailed birth and death rate figures for those herds, however, they were in a period of increase and he didn't ever measure it in the decrease phase and similarly Skoog's work in Alaska has the same weaknesses and the Nelchina herd which Skoog studied declined quite precipitously after his studies and this was not documented.

Similarly, we have knowledge of things like calving grounds, migration routes and





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so on, but although everyone has speculated about the advantages of these, there is very little data that actually indicates which of these speculations is correct. For example, we have all said that the calving grounds appear to have lower densities of wolves, therefore, a lower wolf predation rate and a later date of appearance of insects, which would be a stress factor on the caribou. However, we have very little information about increases in predation rate, or increases in stress from insects when caribou are forced to calve elsewhere and this is why I stress the importance of this experience which is going on right now in Labrador.



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1                               The one herd of Labrador  
2 caribou has been displaced from its calving grounds  
3 and the anecdotal evidence there suggests that yes,  
4 predation has increased and the survival of calves  
5 has decreased.

6                               Finally, just one last remark  
7 here. When Dr. Bergerud was explaining brucellosis to  
8 you he said that it's a disease that's endemic in  
9 buffalo and sometimes encountered in caribou. I want  
10 to make it very clear that I studied the caribou first.  
11 I didn't bring the brucellosis to the caribou.

12                              THE COMMISSIONER: I think we  
13 should adjourn for coffee but might I suggest, Mr.  
14 Marshall and Mr. Carter, that you might wish, if he's  
15 willing, to have Mr. Jakimchuk join the panel afterward,  
16 to comment on what's been said. I'll leave that up to  
17 you. It's only an idea.

18                              Dr. McTaggart-Cowan is still  
19 with us. Maybe he would like to comment on what has  
20 been said, and I only suggest that. You gentlemen do  
21 whatever you like, but it may be it would shorten  
22 cross-examination. We do know -- I put this in terms  
23 of the Inquiry's knowledge, not the body of scientific  
24 knowledge -- but we do know a lot about caribou, at  
25 least we have absorbed a lot of information about them  
26 over the past few months. It may be that <sup>if</sup> Dr. McTaggart-  
27 Cowan and Mr. Jakimchuk join the panel and  
28 comment freely, they might make the task of the lawyers  
29 a little less onerous for the remainder of the day.  
30 At any rate, think about that over coffee.



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1 (PROCEEDINGS ADJOURNED FOR A FEW MINUTES)

2 (PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

3 MR. ANTHONY: Mr. Commissioner,  
4 the suggestion you put to counsel and to this panel  
5 before the coffee break has been discussed by counsel.  
6 I think a number of them want to address you. I should  
7 say that from our perspective and following discussion  
8 with the panel, we are certainly prepared to have  
9 Mr. Jakimchuk, Dr. McTaggart-Cowan, and the other  
10 experts in the room who wish to appear, provided this  
11 helps to facilitate the Inquiry that we have under-  
12 taken, and so we put that proposition forward to the  
13 other counsel and are prepared to proceed if you wish  
14 and if the other counsel wish.

15 MR. RYDER: Mr. Commissioner, as  
16 Mr. Anthony knows the question really is whether Mr.  
17 Jakimchuk on such short notice can feel he is prepared  
18 to join the panel at this stage to make a reasonable  
19 contribution to the proceedings; and at this stage  
20 I understand that Mr. Jakimchuk and Mr. Marshall decided  
21 that it wouldn't be appropriate, and it seems to me  
22 that the decision is theirs.

23 THE COMMISSIONER: Oh,  
24 certainly. Well, that's fine. There's no need to pursue  
25 the matter further.

26 MR. MARSHALL: Sir, I should  
27 perhaps say a word too about that. We do feel that  
28 perhaps it would be best to continue in the usual way  
29 with the cross-examination of this panel as it's  
30 presently constituted. I gather with the addition of the





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1 third member to it we'd be starting again at the top  
2 of the list as we were, and working through. That would  
3 mean that there would be no addition of Dr. McTaggart-  
4 Cowan or Mr. Jakimchuk or others. The reason for this  
5 is that I think it's essential that there be cross-  
6 examination to try to more sharply define the issues  
7 and see if there is some consensus. I feel that it's  
8 somewhat awkward to do this with the addition of others  
9 who are not really on the C.A.R.C. panel, if you like,  
10 being up there, in the sense that -- well, there's two  
11 reasons: (1) These people function as advisors,  
12 assisting the lawyers with their cross-examination, and  
13 (2) The practice has developed, and I think  
14 it's a very good one, that when questions are put,  
15 others on the panel, if you like, are able to comment  
16 on that, and I see some difficulty in the resolution  
17 of that for example, with Mr. Jakimchuk and Dr.  
18 McTaggart-Cowan, if they are able to comment on answers  
19 given in cross-examination by one the other panel  
20 members, and I see sort of a procedural problem.

21 THE COMMISSIONER: You might  
22 wind up cross-examining Mr. Jakimchuk.

23 MR. MARSHALL: In effect.

24 THE COMMISSIONER: Which wouldn't  
25 seem quite right.

26 MR. MARSHALL: Now, sir,  
27 finally I think I should say, though, that at the end  
28 of the day, and hopefully by the end of today this  
29 cross-examination of this panel will have been completed.  
30 We'd be prepared to take a look at that question and



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1 see whether it's at all feasible, if it's considered  
2 necessary to do so, to continue with in effect a debate  
3 tomorrow, given that we have a number of the people  
4 here. I don't know whether or not our people would be  
5 prepared on such short notice to go ahead, but we'd  
6 certainly be prepared to discuss it with yourself, sir.

7 THE COMMISSIONER: I think we  
8 should not pursue the matter. I think cross-examination  
9 will achieve the same end that I had in mind, which was  
10 a clarification of the issues. So who goes first?

11 MR. RYDER: I think the last  
12 time, Mr. Commissioner, we finished with Mr. Bayly who  
13 had completed his cross-examination of Dr. Lent, so I  
14 presume that me might wish to start and he could start  
15 with the panel as a whole.

16 THE COMMISSIONER: Yes.

17 MR. MARSHALL: Mr. Commissioner,  
18 I had discussed this briefly with Mr. Scott over  
19 breakfast this morning. It didn't seem that there was  
20 any necessarily right way of proceeding. My thought  
21 was the panel has been re-constituted, if you like.  
22 There's been an additional person put on, and perhaps  
23 the best way of dealing with cross-examination is to  
24 start at the head of the list once again and that would  
25 -- would that be Mr. Bayly, and then just carry on?  
26 I guess that's what we're going to do. I'm the only one  
27 that doesn't seem to be following.

28 (LAUGHTER)

29 MR. BAYLY: Well, Mr. Commissioner,  
30 with your permission and that of Mr. Marshall I'll



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Cross-Exam by Bayly

1 continue my cross-examination, with the exception of  
2 anything that may have come out of Dr. Bergerud's  
3 evidence. Dr. Lent may wish to comment on further  
4 throughout my cross-examination. I'll be directing it  
5 mainly to Dr. Calef and Dr. Bergerud. I have  
6 already cross-examined Dr. Lent on a previous occasion.

7  
8 CROSS-EXAMINATION BY MR. BAYLY (CONTINUED):

9 Q Now, Dr. Calef, when  
10 you gave your direct evidence you illustrated what  
11 was crystalized in the cross-examination of Dr.  
12 McTaggart-Cowan in that the same data can be looked at  
13 by different biologists and depending on where they  
14 put their emphasis, different conclusions can be  
15 drawn about it as to which either range or which period  
16 of the cycle, the life cycle of the caribou may be the  
17 more important. You have stated that in your opinion  
18 the most important area and the most important time  
19 are the calving grounds and the calving, post-calving,  
20 and summer aggregation times as opposed to Dr. Jakimchuk's  
21 opinion that the winter range and the migrations through-  
22 out the winter are more important.

23 Now, is this -- are we in the  
24 position of this being a theoretical look at the  
25 Porcupine caribou herd or are there reasons that you  
26 have come to the conclusion that you could perhaps  
27 explain in order that we may test the differences  
28 between you and Mr. Jakimchuk?

29 WITNESS CALEF: Well, I think  
30 maybe what you're asking me is whether I'm -- whether





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1 I was just being a devil's advocate when I compared  
2 Mr. Jakimchuk's table and my table, comparing the  
3 pros and cons of the coastal route. I certainly was  
4 arguing in theory and that's what I tried to say again  
5 this morning. We know that caribou of all recognized  
6 herds do go to a traditional calving ground each year.  
7 Therefore we assume that there is something very, very  
8 important about this area, that it's the focus of the  
9 movements of the herd and so on. We assume that there  
10 is a selective advantage to the animals in being there,  
11 and yet actual measurements of this selective advantage  
12 are lacking. So I was certainly speaking in theory  
13 when I spoke in favor of an interior route against a  
14 coastal route, but similarly Mr. Jakimchuk was speaking  
15 in theory when he favored the coastal route rather than  
16 the interior route. But that was my opinion. I was not  
17 just being a devil's advocate in my presentation.



1 Q On page 26 of your  
2 direct evidence you suggest that energy may not be a  
3 factor in reasons for migration and you propose an  
4 alternative hypothesis.

5 A Mm-hmm.

6 Q Now, is there any evidence  
7 which suggests that the energy may not be a factor, or  
8 is this again a theoretical argument which will require  
9 more research in order to substantiate or eventually  
10 throw out if it is not correct?

11 A I think the best example  
12 that suggests that energy may not be the most important  
13 thing is Dr. Bergerud's work with the Newfoundland  
14 caribou. He showed that there were great differences  
15 in the winter habitats of caribou in different years,  
16 that is, in terms of snowfall that would influence the  
17 availability of food and the amount of energy that  
18 would have to be expended to get that food. This was  
19 reflected in differences in weight loss of the females and  
20 in differences in the weight of the embryos at the end  
21 of the winter period and yet he was not able to  
22 demonstrate a very high correlation between the  
23 survival of calves and these weight changes. In other  
24 words, it seemed that survival was almost as good in  
25 bad winters as it was in good winters which would suggest  
26 that there is a margin of safety there in the winter  
27 nutrition.

28 My ideas about insect harass-  
29 ment are based purely on personal experience. I know  
30 that mosquitoes, at any rate, emerge at Old Crow, for



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1 example, at the end of May, the last week of May, and I  
2 know that they don't emerge on the coastal plain  
3 until very late June or July, so my four to six week  
4 difference in insect emergence is a fact. The amount  
5 of insect harassment that would take place in that  
6 six weeks, if the animals were there has not been  
7 quantified. Differences in the wolf population are  
8 suggested by observations that were made and it is  
9 interesting that there may be a very slight difference  
10 in the distance that you have to move to get into or  
11 out of much greater areas of wolf predation. I would  
12 suggest that there is quite a difference in wolf  
13 population on the coast as compared with just over  
14 the mountains to the south, say, on the north edge  
15 of the Old Crow Flats.

16 WITNESS BERGERUD: May I  
17 comment on this?

18 Q Please do, Dr. Bergerud,  
19 because I think you mentioned this question of the  
20 insect predators especially.

21 A Well, in Newfoundland  
22 there are six calving grounds, six sub-populations.  
23 We used to have only 5,000 animals moving between these  
24 six. We have two calving grounds on the winter range.  
25 These animals make no migration at all. These are the  
26 two largest populations, sub-populations right now,  
27 so that I have compared the flora of these six calving  
28 grounds and I have compared it with places where caribou  
29 do not calve and I can see no support for the idea that  
30 they are going to special areas, highly nutritious forage.





1 Q All right, now you would  
2 then feel that Dr. Calef's theory that the migration  
3 is to escape certain kinds of predators, at least in  
4 part, whether they be man, insects, or wolves, --

5 A This is the hypothesis  
6 that I proposed in 1971, that the calving grounds  
7 evolved from places that provided some protection from  
8 wolf predation. I find the insect hypothesis attractive.  
9 There certainly are -- I can see no differences in the  
10 insect fauna on my six calving grounds in Newfoundland  
11 and adjacent areas where there are no caribou. The  
12 caribou are-- they are up on some elevations and there  
13 is some escape from insects, but no long distance  
14 movements relative to insects.

15 Q All right, and Dr.  
16 Calef has expanded on the point that you made on  
17 insects. You talked about a two week respite from the  
18 insects on the north coast before heading back down into  
19 the mountains. Would you agree with him that there  
20 may also be an advantage to the animals in moving to  
21 the North Slope to escape the earlier hatching of  
22 insects farther south, say, in the Old Crow area?

23 A Yes, I agree with that  
24 and that also puts them close to where they gather for  
25 the post-calving aggregation. They don't have far to  
26 go from the calving grounds there. Certainly -- my  
27 theory is that calving grounds have evolved relative  
28 to predators, at least in the Porcupine herd there seems  
29 to be a good bonus that you've picked a place where  
30 the insects are less also.



Calef, Lent, Bergerud  
Cross-Exam by Bayly

1 Q All right, and that may  
4 be coincident, but it may be a lucky break for the  
3 caribou there.

4 A Insects are very important  
5 in this early calving period, so the theory has evolved  
6 that if a female picked the wrong place to have her  
7 calf, her calf hasn't survived, and that is why females  
8 who have picked the right spot -- that gene characteristic  
9 is with us today. So, if you picked the wrong spot and  
10 a wolf got you, and you picked a wrong spot and the  
11 insects so bothered you that you couldn't nurse your  
12 young, your calf won't be with us. So, we can make  
13 predators insects, because insects are as bad as  
14 predators on caribou in a lot of ways.

15 Q Now, if hard winters and  
16 resulting weight loss doesn't seem to have much  
17 effect on the birth of calves, would you agree with  
18 Dr. McTaggart-Cowan that perhaps the calves at heel  
19 a few days after birth may be a very important thing  
20 to know because you may have either very small and  
21 weak calves, or mothers who cannot produce milk because  
22 of hard conditions that they have been through in the  
23 winter, which would cause not a lowering in the  
24 pregnancy, or even live birth rate, but a high mortality  
25 of calves in the first few days or weeks of their lives?

26 A Dr. Calef was referring  
27 to my study. I am studying a group of animals on the  
28 southern edge of the range in which the weather is  
29 not very bad at birth. The wind chill doesn't reach  
30 the kilocalories that is needed to kill animals as



Calef, Lent, Bergerud  
Cross-Exam by Bayly

1 documented, so that my evidence of this is it cannot  
2 be applied to the Porcupine herd. We could have small  
3 calves born in the Porcupine herd because of poor  
4 nutrition and then the tough weather could come, the  
5 spring weather, so that a small calf at birth, plus  
6 tough spring weather, and we could have mortalities,  
7 so that how tough the winter was could affect survival  
8 in the spring. But I argue that the weather in the  
9 winter cannot <sup>be</sup> predicted and is not a function of the  
10 number of animals. It comes, density independently in  
11 our jargon, and it is not a question that there is  
12 no food down there. It is a question that the  
13 animals can't find the food that is there. It is a  
14 relative shortage and isn't related to densities of  
15 animals.

16 Q Dr. Calef, would you  
17 like to respond to that as you studied that particular  
18 herd?

19 WITNESS CALEF: Yes, I  
20 agree with those comments. I think the answer to  
21 your question though, is, yes, it is very, very  
22 important to compare the pregnancy rate, that is, the  
23 number of animals who are carrying calves just prior  
24 to birth, with the number of live births and then  
25 with the number of calves at heel throughout the  
26 summer, and I think that one of the biggest weaknesses  
27 of our knowledge of the Porcupine herd is that we  
28 don't have a pregnancy rate which Dr. Bergerud has  
29 pointed out has been similar in all caribou herds that  
30 have studied and very high and if it is high in the





Calef, Lent, Bergerud  
Cross-Exam by Bayly

1 Porcupine caribou herd, then it is clear that we are  
2 losing substantial numbers of animals between late winter  
3 and just within a few days after birth. If he is  
4 talking about a pregnancy rate of perhaps 80%, that  
5 is, 80 calves per 100 cows, at minimum, and we are  
6 talking about a 47% to 66% live birth rate, then we  
7 are losing a lot of animals; and then, of course, this  
8 goes down also as the summer goes along.

9 Q Now, with regard to  
10 wolves as predators, one of the data gaps that was  
11 identified by Dr. McTaggart-Cowan, was a scarcity of  
12 knowledge on how many wolves there are, how much wolf  
13 predation there is on this herd and to what extent the  
14 wolves follow the herd, and I suppose what follows from  
15 that is to what extent the caribou escape a proportion  
16 of the wolves by coming on to the North Slope for  
17 their calving and other similar activities.



Calef, Lent, Bergerud  
Cross-Exam by Bayly

1 A I agree with that.

2 Q Do we know anything  
3 about whether or not the wolves actually follow the  
4 caribou onto the North Slope, or whether they stop to  
5 den in the mountains in numbers along the way?

6 A In terms of individuals  
7 actually following the herds, we don't know. The only  
8 way you can substantiate that for certain is to have  
9 marked animals, marked wolves individually recognizable  
10 wolves. However, I think we have at least qualitative  
11 evidence that there is quite a difference between the  
12 number of wolves on the North Slope, that is the calving  
13 grounds, and on the areas further south, and I think  
14 there is theoretical reasons why this should be so.  
15 All one has to do is ask the questions what wolves would  
16 eat on the calving grounds during the winter when the  
17 caribou aren't there, if they're not wintering on the  
18 North Coast? Certainly if the caribou stayed on the  
19 coast as Dr. Lent just pointed out they do in some  
20 years, then there may be wolves there the following  
21 summer, and this may be one reason why we don't see  
22 them wintering on the North Slope very often.

23 Q Now, we've again had  
24 Dr. McTaggart-Cowan refer to certain areas where it  
25 would be nice to know things about this herd so that  
26 it could be predicted by impact, perhaps by not just  
27 the pipeline but other activities might have on the  
28 herd, and how these either can be avoided or mitigated  
29 if they do occur. Can you suggest areas of research  
30 that might be conducted prior to any decision on where



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Cross-Exam by Bayly

1 to go, or any commencement of construction that would  
2 facilitate the protection of this caribou herd?

3 A Yes, I think my shopping  
4 list would be very similar to the one that Dr. Bergerud  
5 presented this morning. The other thing I would like  
6 to see just in the way of commitment is a formal  
7 scheme by the applicant of what type of studies would  
8 be considered to monitor the herd during and after  
9 construction, not just for the purpose when I use the  
10 word "monitoring" I don't mean just for the purpose of  
11 telling the bulldozer drivers, "The caribou are coming,  
12 you've got to shut down." I'm talking about doing the  
13 detailed demographic work that I've discussed before.  
14 You know, we can go on saying, "We need for information,  
15 we need more information," indefinitely, but assuming  
16 that a decision will be made at some point, it would  
17 at least be nice to say, "Well, O.K., if the pipeline  
18 is built, regardless of how or where, how are we going  
19 to go about gaining the maximum information that we  
20 can get it?"

21 Q Now, you said that your  
22 list would basically be the same as Dr. Bergerud's.  
23 Are there things that you would add to it, or things  
24 that you would say should be deleted from it? It's  
25 on page 18 of his evidence.

26 A Well, I think it's  
27 very important to distinguish between birth rate and  
28 pregnancy rate. He commonly equates birth rate with  
29 pregnancy rate, which I think is has been proven out  
30 it can be assumed  
in his studies but I don't think it's going to hold





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1 with the Porcupine herd, so I think both of these  
2 things need to be done. But otherwise I think that's  
3 a fairly complete list of at least the demographic  
4 work that's required.

5 Q Dr. Lent, would you  
6 modify this list in any way?

7 WITNESS LENT: No, offhand I  
8 can't think of anything additional.

9 Q With regard to the list,  
10 Dr. Bergerud, would you care to comment on the additions  
11 that Dr. Calef has suggested adding that statistic on  
12 births as well as the statistic on pregnancies?

13 WITNESS BERGERUD: Yes,  
14 certainly I think that we ought to know the pregnancy  
15 rate. I guess I should have said the pregnancy rate  
16 instead of the birth rate.

17 Q Now, with regard to your  
18 third point on this list, and that is to bring in  
19 the lower jaw-bone of harvested animals, my understanding  
20 is that generally if there is a choice that hunters  
21 will shoot cows and young bulls, which may not give  
22 you an accurate representation of the herd. Would you  
23 want to combine this with observations, or would you  
24 feel that No. 3 is sufficient?

25 A Well, I changed my  
26 mind since last night. I would like to change this  
27 whole system. There's the story in universities where  
28 a graduate student comes up to a professor and says,  
29 "I can't get any data on my animal. I should study  
30 another species."



Calef, Lent, Bergerud  
Cross-Exam by Bayly

1 The professor says, "Can you  
2 kill your animal?"

3 He says, "Sure, I can kill an  
4 animal."

5 The professor says, "No sweat,  
6 there's at least ten theses if you can get the bodies  
7 of animals."

8 So I think that something that  
9 might get the baseline data for this herd at a lot  
10 faster rate than this is to follow the example done  
11 by the C.W.S. on the Kaminuriak herd because C.W.S.  
12 has a long history of having a difficult time gathering  
13 population data, and their last study with Miller,  
14 Miller, Daulphine & Parker, they were given the go-ahead  
15 to collect 1,000 animals, collect them at different  
16 times of the year. This is the first time that they've  
17 really had good statistics and they've really gotten  
18 into the data and of course these animals that they  
19 collected were all turned over to the native peoples.  
20 So it would be my recommendation that this is a healthy  
21 herd, it can certainly stand a harvesting of an  
22 additional harvest of 1,000, or maybe you could tell  
23 the natives that you'll shoot their animals for them  
24 this year, that they develop a scheme and go in there  
25 and get a large sample of animals, at various times of  
26 the year, and we just will get all the data we need  
27 to get some baseline data and get started, and get  
28 the birth rates, we'll get the death rates, we'll  
29 get the information on disease, on brucellosis, we'll  
30 get the condition of the population, we'll get the



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1 food habits, all the Kaminuriak herd study is basically  
2 based on these thousand animals. They had four naive  
3 caribou biologists who started out, they had a herd  
4 that's just as difficult to study as this one, and as  
5 far as I'm concerned, they did considerably better  
6 work than the Renewable Resources people in three  
7 years in understanding the biology of the herd, and  
8 this was because they got the go-ahead, collected a  
9 large number of animals themselves and put statistics  
10 to it, and from then on of course you might want to  
11 continue some kind of a program like that, a couple  
12 of hundred animals each year and get the pregnancy  
13 ratio each year, keep up with the age of the population.  
14 So it would be a recommendation of mine that serious  
15 consideration be given to a keen effort to bring in a  
16 blood man -- there's a man in Minnesota, Dr. Karnes  
17 who will write you pages and pages on the blood chemistry  
18 of caribou, if you will just let him get in there with  
19 his needle. There's a wealth of information in those  
20 bodies and we can spend years chasing natives and  
21 looking through binoculars, and not get this data. I  
22 think it behooves the applicant, if he doesn't want to  
23 get criticism ten years hence, to get the baseline data  
24 now before development.

25 Q All right, and I take it  
26 from this that in order that every applicant who wants  
27 to build something doesn't study the herd and completely  
28 decimate it, that this should be done in co-operation  
29 with all the people who are interested in the herd  
30 whether they be government, native peoples, applicants





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1 for rights-of-way so that everybody doesn't take 1,000  
2 animals.

3 A Well, this can, of course,  
4 be a big social problem. You've got to have everybody  
5 pulling with you before you start telling people that  
6 you're going to take 1,000 animals.

7 Q Now, the list that you've  
8 given us, Dr. Bergerud, and the comments that Dr. Calef  
9 has made on it, if we had the statistics that these  
10 studies would generate and if we were in a position to  
11 take the thousand animals that you have recommended  
12 for various studies from birth rates to serology,  
13 would we be in a position to manage this herd, not just  
14 to know about it but to make rules about what should  
15 happen to it, how it should be harvested, and whether  
16 facilities should stay away from it in certain areas,  
17 etc, or would we be provided with baseline data which  
18 would take us one more step but not into the realm of  
19 being able to responsibly manage the herd?

20 A Management goes on for-  
21 ever. This is baseline data that we need. This is  
22 where we start. There may be a cohort missing in this  
23 population. Nobody's looked at the age structure. When  
24 the Kaminurak people looked at the age structure they  
25 found a 1962 cohort wasn't there and verified that  
26 an observation of Kelsall years before that there was  
27 winter starvation in '62. So this is just baseline  
28 data. Management goes on year after year. What is the  
29 percent of calves in October? What is the percent of  
30 calves in March? That tells you what's going on relative



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Cross-Exam by Bayly

1 to wolves during the winter. If wolves are taking large  
2 numbers of animals, the new generation is continually  
3 going down in numbers, the difference between October  
4 and March tells you what part wolves play in this.  
5 So management is continually monitoring and not always  
6 a census because our techniques of census are not  
7 sophisticated enough to tell a population change  
8 between year 1 and year 2. Our magnitude of error is  
9 so great that we can't detect change by annual censuses.  
10 Maybe every five years you count the animals.

11 Q Right.

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Calef, Lent, Bergerud  
Cross-Exam by Bayly

1 A So you do this through knowing  
2 reproduction and knowing survival. As a general rule  
3 we can say that caribou herds that have 15% calves in  
4 the fall are probably stable in numbers. Caribou  
5 populations with less than a 10% increment may be  
6 decreasing. Those with more than 15 may be increasing  
7 and so then these yardsticks themselves tell us,  
8 give us a good handle on where this population is  
9 going, even without a total knowledge of numbers.

10 Q Well, realizing that  
11 management is a dynamic process, and the rules change  
12 from year to year or season to season depending on  
13 what has happened to the herd, do you feel that we  
14 would be in a position to embark on a sensible manage-  
15 ment program given this baseline data that you  
16 have recommended in addition to what has been gathered  
17 already.

18 A Are you asking me?

19 Q Yes.

20 A No, I feel that wolves  
21 are an important part of this system and I think we  
22 have to come to grips with wolves. I think that we  
23 have to census wolves. I am going next week on a  
24 census of wolves in Ontario and we have to know how  
25 many wolves there are. I could go into how we could  
26 count these animals. We also have to track these animals  
27 around and find out how many caribou they are killing  
28 versus how many moose they are killing and determine  
29 their role in the natural equation of this population.

30 Q And would either Dr.





Lent or Dr. Calef care to comment on this baseline  
as a tool for management and whether anything in addition  
to studies on wolves that have not been conducted should  
be added to enable us to intelligently and predictably  
manage the herd?

WITNESS LENT: I just might  
comment that I think the suggestion of a collection  
program is a reasonable and a desirable one. However, I  
think we will probably have to depend on Canadians  
to do it. For political reasons it is highly unlikely  
that an Alaskan biologist would be able to participate  
to any significant extent in such a program.

THE COMMISSIONER: Excuse me,  
Dr. Lent, why is that?

A Well, basically, the  
game administrators in Alaska have generally had a  
philosophy of great reluctance to enter into large  
scale collection programs.

THE COMMISSIONER: Oh, I see.

A Secondly, we are faced  
right at the moment with the great possibility of  
having to restrict native harvest, particularly with  
regard to the Arctic herd and that makes it a very  
inopportune time for government to suggest a collection  
program at the same time that they are attempting  
to restrict native harvest.

One other item which isn't  
explicitly mentioned in Dr. Bergerud's list, is monitoring  
of non-native harvests, and this has certainly increased  
in the Arctic portions of Alaska, in part indirectly



1 because of the northern development of increased popu-  
2 lations, increased mobility and increased affluence.  
3 So, certainly, this would have to be included in the  
4 shopping list.

5 WITNESS CALEF: I think  
6 that we have to really ask two separate questions  
7 about a research program like this. One is the one  
8 that you were pursuing about management and I think  
9 that there is no question that you have to have that  
10 data for management and that you would be in a much  
11 better position to monitor the herd if you did have  
12 it, but I think that you are also asking about how  
13 it would enhance our predictability of the effects  
14 of the pipeline. I think that it would help somewhat  
15 along those lines, but it still would probably not  
16 eliminate the types of arguments that we are having.  
17 I think the most important aspect of this sort of  
18 thing is that it would allow us to detect as early  
19 as possible, changes in the herd that did seem sub-  
20 stantial, and if these continued, became a trend, then  
21 we could begin to look and look very hard about  
22 why was this occurring, why had this changed, was it a  
23 pipeline, was it a new pattern of hunting, was it more  
24 aircraft disturbance, was it natural, what was it? At  
25 least we would know that something was going on.

26 I would like to add one more  
27 thing to the list, too. If we are going to have  
28 caribou encountering human activities of various  
29 kinds, I think maybe we could start to begin to  
30 quantify behaviour in some ways. For example, Almer



Calef, Lent, Bergerud  
Cross-Exam by Bayly

1 DeBock of -- first with Renewable Resources, and  
2 then with the Canadian Wildlife Service, collected  
3 behavioural observations about the reaction of caribou  
4 to seismic lines, to the Dempster Highway, and so on.  
5 I think that it is very important in terms of  
6 the recommendations that Dr. Cowan was talking about,  
7 having no hunting zones on the highway, about having  
8 convoy systems of traffic and so on to really document  
9 how these are affecting the caribou. Is there a  
10 reluctance of the animals to cross the highway, and  
11 is this reluctance increasing and can we see  
12 correlations with any changes in the use of the  
13 highway, and so on, and you can even quantify behaviour  
14 of the animals themselves. For example, you can look  
15 at things -- on the calving grounds, things like for  
16 example, the duration of the nursing of the calves and  
17 how their flight distance from humans or aircraft,  
18 or whatever have changed with time and so on, and if  
19 you have enough observations, you can quantify these  
20 things.

MR. ANTHONY:

21 Q Now, Dr. Calef, you  
22 have studied some of these things yourself, I understand,  
23 the responses of caribou to aircraft overflights which  
24 have been studied by both the applicant and Mr. DeBock.

A Yes.

26 Q And when we refer to  
27 responses of caribou to overflights, as I understand,  
28 we are talking about something quite different from  
29 the effects.

A We certainly are.





Calef, Lent, Bergerud  
Cross-Exam by Bayly

I tried to make it very clear that I was looking at only the most obvious responses of the animals. In other words, what did they do when the airplane flew by, rather than, if they did this what did it mean. The only real separation of effects that we could make is that some type of behaviour seemed to us to carry a danger of immediate injury to animals. When you see animals stumbling, colliding with each other, running into bushes, and this sort of thing, you can assume that legs are going to be broken, that internal injuries are going to occur, that damage to the fetus, to an almost term fetus will occur and so on, and you can also, from just basic studies of animal physiology know that the energy expenditure has gone up six to eight times, perhaps. But you can't say just because the animals did not run, and run for a long time, that they didn't get excited, that it was not an unpleasant experience which will be remembered and associated with the area where it occurred or the circumstances under which it occurred and so on, and these things we're just in our infancy in being able to measure.

Q All right, and you have read the report that Commission Counsel tabled by Dr. Geist which talked about the differences between responses and effects of aircraft disturbance and the difficulty in measuring them?

A Yes, I did.

Q And could you comment on his observations in that report and as well the



Calef, Lent, Bergerud  
In Chief

1 observations made in cross-examination by Dr.  
2 McTaggart-Cowan, that experiments that measure  
3 effects, or that even measure responses have to be  
4 very carefully controlled by the observer or experimenter  
5 if they are going to be of any value?  
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Calef, Lent, Bergerud  
Cross-Exam by Bayly

1                                   A       Yes, I agree with the  
2       necessity to separate response from effect.       I think  
3       that Dr. Geist's comments were formulated in terms of  
4       the most desirable knowledge that we could get. In  
5       other words, if we could conduct ideal experiments  
6       this is the knowledge that we would like to have.  
7       I think with the budgets and just the difficulties in  
8       studying caribou in wilderness areas -- forgive me for  
9       using the word -- but they don't have any roads, and  
10      it's very difficult to do. I think some of his sugges-  
11      tions, for example, the possibility of filming exactly  
12      what happened would decrease subjectivity at least  
13      anyone who objected and said, "Gee, I don't believe  
14      that you could fly that low without scaring them,"  
15      could be shown films and then he could make his own  
16      analysis.

17                                   But some of the things that  
18      he suggests are very difficult to do. I think there  
19      are three levels of effects of any disturbance that  
20      we have to look at. One is that immediate injurious  
21      effect. One is sort of a medium long-term effect which  
22      would be mostly, I think, energy expenditure and phy-  
23      siological changes, and then the third would be the  
24      very long-term which I think would be associated mostly  
25      with behaviour in which an animal would just associate  
26      a particular locale with unpleasant experiences and  
27      might alter his use of that area in the future. It's  
28      very difficult to get that, but we do have a little bit  
29      of evidence for that from Dr. Gunn's presentation in  
30      which he did experiments with the response and the





Calef, Lent, Bergerud  
Cross-Exam by Bayly

1 effect of aircraft overflights on nesting birds in  
2 some areas up on the coast, and he detected very,  
3 very slight changes in the first year, and yet in the  
4 second year he found that the distribution patterns of  
5 birds on that area had altered, and possibly because  
6 of what had happened the year before.

7 Q Would you consider  
8 that even though the data on overflights may be coarse,  
9 I think, is the word. that Dr. McTaggart-Cowan uses,  
10 or painted with a broad brush, but nonetheless a  
11 disturbance by both aircraft and motorized snow vehicles,  
12 etc., is something that does affect caribou seriously  
13 and should be avoided or minimized by flying higher  
14 and not driving close to them.

15 A Certainly it should be  
16 minimized. Anything we can do to reduce our disturbance  
17 to these animals should be done. I think that the  
18 research that has been done has been sufficient to  
19 give us limitations at least assuming that we've done  
20 it in enough years and enough circumstances, and I'm not  
21 quite sure about this, but I think we can at least  
22 eliminate the first category of response. I talked about  
23 the kind that would result in immediate injury.  
24 Really this is something that a pilot can judge for  
25 himself, if he sees that he's flying in a given area  
26 and caribou are running and running fast away from the  
27 aircraft, then I think he can assume that he's doing  
28 some sort of damage to those animals. But I think we're  
29 in more or less of a position to put aircraft altitude  
30 limitations that will eliminate immediately injurious



Calef, Lent, Bergerud  
Cross-Exam by Bayly

1 responses. Again these may change with experience  
2 but I don't think we're in a position to fine-tune it,  
3 as you said, and talk about frightening animals and  
4 having physiological changes to them.

5 Q Now, I take it from the  
6 comments that the three of you made on the fact that  
7 it may be that biologists have harassed caribou as  
8 much as anybody has, that the good guy that just wants  
9 to help the animals or photograph them or study them  
10 is as much of a liability to the caribou as the inad-  
11 vertent or careless pilot.

12 A Yes, I would agree with  
13 that entirely. The only thing that worries me, and this  
14 is a comment that I want to make on something that  
15 Dr. Bergerud said, and just it slipped my mind. He  
16 was talking about how single developments in the past  
17 had seemingly not had a very great impact on some  
18 caribou populations, at any rate he was talking about  
19 a highway, a railway, the Steese Highway and so on,  
20 and this may be entirely true. However, if you start  
21 to consider areas in the north and the changes that  
22 are coming into some of these areas, you begin to  
23 see how these things add up. For example, at the time  
24 that Dr. Banfield was studying the Churchill Railway  
25 he was actually using that railway to study the caribou  
26 because aircraft just weren't that common in the late  
27 '40's and certainly before that when the railroad was  
28 constructed; but when you consider now there's great  
29 use of aircraft. Snowmobiles are in the hands of both  
30 people doing work in the north and recreationists and



Calef, Lent, Bergerud  
Cross-Exam by Bayly

1 native people and are used for hunting, you've got  
2 highways, you've got great alterations in the natural  
3 environment through networks of seismic lines and  
4 winter roads which are very significant in some cases,  
5 and as Dr. Bergerud has pointed out, very, very well  
6 would completely alter wolf -caribou inter-actions  
7 possibly in favor of the wolf, and an increased  
8 human population. You begin to see how these things  
9 add up, so perhaps in the past the amount of disturbance  
10 to a caribou population has been below the threshold  
11 that they can tolerate; but as these things build up  
12 and each one of them become used more and more, there's  
13 an increased population that wants to hunt more, wants  
14 to see caribou more, it all adds up and the energy  
15 comes from the same place.

16 Q And I take it you'd  
17 agree with that, Dr. Bergerud, and that's the reason  
18 you're studying the relics of herds in the North Shore  
19 of Lake Superior area rather than whole herds.

20 WITNESS BERGERUD: I don't  
21 know if I'd agree with all of that. I think in my  
22 demographic work I worry about an animal gone more than  
23 these subtle differences. I think the evolution of  
24 caribou is a dynamic thing, that they are continually  
25 evolving, and I'm studying some of these strange little  
26 populations because they have really evolved and are  
27 really different. So that I think caribou will make  
28 it with disturbance. In evolution, though, we have to  
29 go slow. We have to give species time to keep evolving.  
30 When rats were let loose on islands in the Pacific





Calef, Lent, Bergerud  
Cross-Exam by Bayly

1 the flightless birds couldn't evolve wings the next  
2 day to get away from the rats. So we lost them. So that  
3 I think that caribou will evolve with man in the north  
4 and one might have made these same observations many  
5 years ago when one first started across the prairies  
6 and saw all these wilderness antelope and wondered if  
7 they were going to be able to adapt to the wagon trains  
8 and the super highways that came later. So I'm more  
9 optimistic than Dr. Calef, perhaps, and would, given  
10 the time to evolve, allow these populations to keep  
11 evolving, I think that they're going to continue to  
12 adapt. There is a difference that I made in my papers  
13 in that large populations have a harder time to adapt  
14 than small populations. There's a much bigger gene  
15 pool and there is the problem that there can be different  
16 selective forces on a population so that it can't evolve  
17 towards getting better adapted to man. If man hunts  
18 caribou different than wolves, and the caribou population  
19 has both man and wolves coming after it, it's quite a  
20 dilemma in survival, which strategy pays off.

21 I have studied the population  
22 on the Avalon Peninsula of Newfoundland that started  
23 with 100 animals, and they had tremendous flight dis-  
24 tances and I think that this is in the genetic makeup  
25 of the populations, not just a learned response. But  
26 if this population had had wolves with it, who were  
27 hunting them different than man, I don't think that they  
28 could have evolved as quickly towards man. I think that  
29 man and wolves often are quite different. So I don't  
30 know how that adds to it. I think that we can be



Calef, Lent, Bergerud  
Cross-Exam by Bayly

1 hopeful that if we don't kill the animals, if we don't  
2 add sufficient stresses to their lives where they  
3 actually die, that they are here to evolve and keep  
4 up with the dynamic changing environment that perhaps  
5 we can co-exist.  
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Lent, Calef, Bergerud  
Cross-Exam by Bayly

1 Q All right, you do share the  
2 concern though that if the pipeline is not the only  
3 activity to use the North Slope of the Yukon that  
4 we may not be looking 10, 20, 30 years from now at  
5 one of the major spectacles in the earth but your  
6 grandson may be studying another relic population.

7 A Well, I am interested in  
8 how developments change the number born and the number  
9 that die. That is the only way a population changes.  
10 If it goes somewhere else, it still exists. But if  
11 there is no place to go. That, of course, is the end  
12 of the population. If we so screw up the ecosystem  
13 that all the animals are reaching different levels  
14 and out of control, we are certainly in trouble.

15 I mean that is what  
16 pollution is. Pollution is where one species gets  
17 out of control. We put our pollutants into the water  
18 system and one micro-organism takes over the system from  
19 the other species that were coexisting.

20 So that it is a very complex  
21 problem and given that we do not kill these animals  
22 and their birth rate isn't changed and that we allow  
23 them to have this vast area to make their right mix of  
24 food, insects, predators and weather, I think they have  
25 got a good chance to continue to exist.

26 Q All right. And your evidence  
27 indicates that the importance of their existence is not  
28 just for biologists and interested people and the  
29 caribou themselves but you describe them as the hub of  
30 this wheel of coexistence between the various species --





Lent, Calef, Bergerud  
Cross-Exam by Bayly

1 THE COMMISSIONER: Most influent  
2 element. No, that is the technical term. It was  
3 described to me yesterday.

4 A Yes, all one has to do is  
5 go and fly over the country and see the trails and see  
6 what these animals are doing on the flora and the soil.

7 The caribou are the tying  
8 element. If you want to call that an ecosystem, that  
9 those animals are in, that, define it by the caribou.  
10 They are the animal that set the outer limits. I mean  
11 ecologists have had terrible arguments about what is  
12 an ecosystem and so I am defining my ecosystem as  
13 the area travelled by this herd and that area is not  
14 static as this herd increases, it will increase its  
15 area.

16 So the ecosystem is a  
17 dynamic thing. It changes in size.

18 Q Now, Dr. Calef, if I can  
19 go back to you and some comments on Dr. Geist's paper,  
20 on page 4 of that report, and I don't know if you have  
21 a copy of that?

22 WITNESS CALEF: No, I do not.

23 Q On page 4, Dr. Geist makes  
24 the statement that harassment by greatly elevating  
25 metabolism of the body elevate the cost of living to  
26 the animal at the expense of its body growth development  
27 and reproduction. Is that a statement that you would  
28 be in a position to agree with?

29 A Well, yes, this is exactly  
30 what I meant when I say the animal has only one pool



Lent, Calef, Bergerud  
Cross-Exam by Bayly

1 of energy to partition for all its needs, growth,  
2 reproduction and response to the environment of which  
3 disturbances are part. Therefore, if you increase the  
4 amount required to deal with disturbance, you are cutting  
5 down the amount that is available for the others. It is  
6 just a simple equation.

7 Q All right. He goes on at  
8 page 7 to comment that harassment can lead to death,  
9 illness or reduced reproduction due to secondary  
10 effects of physical exertion and temporary confusion  
11 and this is the kind of phenomenon I understand that  
12 Dr. Kalen was referring to when he was talking about  
13 snowmobiles and their potential effects on animals.  
14 Would you agree with that statement?

15 A Certainly this is, this would  
16 be my <sup>first</sup> category as I discussed before, immediately  
17 harmful effects of harassment. One very obvious one  
18 that I have seen both with caribou and with bison is  
19 separating calves from cows and once a calf is separated  
20 from the cow it has a much lower chance of survival  
21 and for example, in our bison roundups we often are  
22 very dismayed to find that one of the herd is run out  
23 of the corral at the end. There is another calf left  
24 behind and I would assume that that is the end of  
25 those or at least that the chances of their survival is  
26 much lower.

27 Q All right.

28 A Of course, this depends on  
29 a time of the year but this is one example of what I  
30 meant when I spoke about our lack of knowledge about



Lent, Calef, Bergerud  
Cross-Exam by Bayly

caribou biology.

1 We know that calves, caribou  
2 calves follow the female throughout the year right up  
3 until the time that she returns to the calving grounds  
4 the next year but there have been very few studies  
5 of how the behaviour of the cow sort of increases the  
6 survival chances of that calf throughout the year  
7 through all the changing of environments, changing  
8 weather and so on.

9 For example, there is the  
10 reason that cow caribou have antlers in the winter whereas  
11 the bulls don't so that the cows can be the dominant  
12 animals. Now, in any competition for food for example.  
13 And does the calf share the dominance that the female  
14 has. We see nursing in the spring. I have seen  
15 nursing by 10-11 month old animals. In fact, I have  
16 even seen one or two cases of nursing on the calving  
17 grounds by <sup>a</sup>yearling from the year before, how important  
18 this is, could this be an important factor in getting  
19 the calf through a hard winter and this sort of thing  
20 so I --

21 WITNESS BERGERUD: I would like  
22 to comment.

23 WITNESS CALEF: Okay.

24 WITNESS BERGERUD: I, of course,  
25 I always have to say, I have no information on the  
26 Porcupine herd but I have been on the winter range of  
27 quite a few caribou herds and Dr. Lent is the expert  
28 on the mother-child relationships with our species so  
29 he should comment but with caribou, the weaning process  
30 is well on the way in October and in fact when the





Lent, Calef, Bergerud  
Cross-Exam by Bayly

1 old lady is being chased by the bull, the calf is  
2 really in the way.

3 And she no longer is, with  
4 very few exceptions, she is no longer tolerant of nursing.  
5 Now, he has an image of her as his mother and he  
6 continues to follow her for a long time but this bond  
7 gets weaker and weaker and when you go out on the winter  
8 range, you may still see calves following adults and  
9 there is very little tagged information on this but you  
10 will also see lots and lots of lone long calves. Long  
11 calves are the calf which is, that is a winter calf.  
12 You will see lots of calves that are travelling with  
13 other calves and that have picked up bulls that they  
14 are travelling with so my experience in 13 years on the  
15 calving grounds, I have seen only four or five yearlings  
16 that were nursing and it is kind of a generalism. Maybe  
17 Dr. Lent as one that has helped develop this that in  
18 gregarious species that you socialize into the  
19 herd considerably faster than solitary forest dwelling  
20 species so that I think that a lot of Henshaw's  
21 original argument as to why females had antlers was  
22 not the calf was benefitting from getting into the  
23 crater dug by the female but that this was a male-female  
24 advantage that the males have lost their antlers and  
25 therefore the female could dominate the male with  
26 their antlers in the winter. Of course, Bubernik  
27 disputes the whole hypothesis.

28 So I just want to say that  
29 my experience is that even by the first of October the  
30 calves are pretty much on their own and use the winter



Lent, Calef, Bergerud  
Cross-Exam by Bayly

1 as a period to get acquainted with other members of the  
2 herd and in a few exceptions follow the female all  
3 the way back and nurse but quite exceptionally.

4 WITNESS CALEF: I would put the  
5 emphasis a little bit differently. I have seen, we have  
6 had experience tagging caribou on the Porcupine River  
7 crossing in the fall, this was just prior to the rut  
8 and we found that the best way to tag a cow and a calf  
9 was to catch the cow and the calf just swam around in  
10 the river waiting until that cow was let go and then  
11 we could go and catch the calf and I have many photographs  
12 of animals in single file on spring migration which show  
13 cow-calf, cow-calf, cow-calf and so on and it is  
14 my experience that the great majority of the calves do  
15 stick with their cows and that, Dr. Bergerud has  
16 experience with more different herds than I do. I just  
17 have the experience with the Porcupine herd but it is  
18 different.



Calef, Lent, Bergerud  
Cross-Exam by Bayly

Q Dr. Lent, you have been billed as the authority on mother-child relationships.

WITNESS LENT: I would like to abstain, but I think that Dr. Calef has said that we need to know a lot more about mother-calf relationships in the fall and winter and I think that Dr. Bergerud agrees with that and most of what all of us are saying are generalizations -- there seems to be annual variation in the number of calves nursing in the wintertime. It needs more thorough investigation, but I think that we would also all agree on the importance of the cow-calf bond during the summer period for a variety of reasons, nutritional and others.

WITNESS CALEF: I think that I am at fault for leading us off on a tangent. Your original question was, can immediate harm come to animals from harassment, and the answer is yes.

THE COMMISSIONER: I think that you did lead us off. So far I think we have in absolute numbers of five or six yearlings seen nursing in the -- well, I think that we will adjourn until two, and Mr. Ryder, would you talk to counsel about how long the cross-examination of this panel is likely to take, and if it is likely to take longer than this afternoon, you might speak to counsel and the court reporters about sitting this evening as an extraordinary measure.

Two o'clock then.

(PROCEEDINGS ADJOURNED UNTIL 2 P.M.)





Calef, Lent, Bergerud  
Cross-Exam by Bayly

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. MARSHALL: Mr. Commissioner,  
if I may start the proceedings. I have a copy of a  
report from Aquatic Environments Limited entitled:  
"Fisheries investigations in the Mackenzie  
Delta in the vicinity of the cross-delta  
alternative pipeline route."

Dated December, 1975. This report is a preliminary  
report of the data. Dr. McCart tells me that they  
have additional data that he has not yet completed the  
analysis of, and therefore there will be an updated  
data report later on. As well, the assessment of the  
data has not been completed, so there will be another  
aspect of the report as well.

Due to a foul-up with P.W.A.,  
this didn't get to us before Christmas. It was sent  
off and it got lost somewhere and I just got it today,  
and I've only got two copies. One I'll leave in our  
office and I'll leave one with Miss Hutchinson so  
counsel can examine it. Thank you, sir.

MR. ANTHONY: Mr. Commissioner,  
if I may also table a report, when Dr. Lent was here  
before Christmas he referred to a study done on the  
Alaska National Wildlife Range, and we now have a copy  
of that study. It's entitled:

"Alaska National Wildlife Range, Wilderness  
Study Report,"

dated April, 1973, it's a draft report and I have left  
that with Miss Hutchinson for the information of counsel  
and I would ask that that be given the next exhibit number.



Calef, Lent, Bergerud  
Cross-Exam by Bayly

1 MR. BAYLY: Q Dr. Calef, We have  
2 heard evidence from Dr. Bergerud today about high-  
3 ways by themselves not necessarily being harmful to  
4 caribou, and I'm assuming that's a highway with  
5 nobody was carrying on any activities adjacent to it  
6 like hunting or photo taking or chasing caribou with  
7 skidoos, etc. As I understand, there has been some  
8 research done by Elmer DeBock on highways per se, and  
9 he has listed some components on the effects of roads  
10 on caribou, and they include the height of roads above  
11 surrounding terrain, and the slopes of the banks, and  
12 snow depth along roads, and the kinds of surfaces on  
13 the roads, as well as traffic and hunting as being  
14 possible things that affect caribou, and are you acquaint-  
15 ed with DeBock's research, and do you have any comments  
16 on it either agreeing or disagreeing with it?

17 WITNESS CALEF: I knew that the  
18 research was done and I know Elmer, but I have never  
19 seen a copy of the final report or even of the draft  
20 of what hopefully will someday be his final report.  
21 Here it is right in front of me. If I were a speed  
22 reader I would look at it. You know, there's no  
23 reason why these things shouldn't be expected to affect  
24 the behaviour of caribou, and I assume Elmer has done  
25 a good job of observing and recording some of these  
26 things.

27 Q Dr. Bergerud, you  
28 have a copy of the report, have you read it and do  
29 you have any comments on those possible physical  
30 effects of roads? You've talked about other effects,



Calef, Lent, Bergerud  
Cross-Exam by Bayly

activities off roads to a certain extent.

WITNESS BERGERUD: Well, I didn't go at it very deeply since you asked me whether I had read it, and I said I hadn't, and you said you weren't going to cross-examine me on it.

(LAUGHTER)

Q Did I say that?

A She said that, yes.

Well, he mentions caribou coming and stopping and going through a period of orienting into the road, <sup>I have seen this</sup> in Newfoundland. I could really tell you a funny story. I'd better not.

MR. MARSHALL: Why not?

A Well, we were trying to catch these caribou that were crossing this road and we built a trap there, and it was about ten biologists and wildlife management officers hiding in the bushes there trying to get these caribou to come into this trap, this was about four o'clock in the morning, and these caribou were right out there just trying to make up their minds whether to go into this trap, and the road was right behind us. We should never have put the traps near the road but that's the only place we could catch them. Just as the first leading old lady was going to go into the trap, this taxi cab comes down this road right in the middle of nowhere, hundreds of miles from anywhere. This taxi cab comes down the road, stops, a person gets out, relieves himself -- there's eight of us hiding in the bushes watching this -- slams the door and there go our caribou.





Calef, Lent, Bergerud  
Cross-Exam by Bayly

1 (LAUGHTER)

2 (ARCTIC NATIONAL WILDLIFE RANGE, ALASKA,  
3 WILDERNESS STUDY REPORT OF APRIL 1973 MARKED  
4 EXHIBIT 404)  
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Calef, Lent, Bergerud  
Cross-Exam by Bayly

1 Q That is the most  
2 enjoyable piece of evidence that we have had so  
3 far.

4 A So, our caribou in  
5 Newfoundland used to come down and hesitate at the  
6 road even though there wasn't any traffic. Dr. Geist  
7 talks about the fact that a road isn't part of the  
8 perceptive environment of a caribou and its meaning  
9 to the caribou isn't quite clear, so just a road,  
10 per se, causes some hesitation, but if there is no  
11 disturbance, these animals went across. So, anything  
12 about the road that will make it look less like  
13 caribou country, grades and snowbanks -- snowbanks are  
14 actually very bad usually on roads. Caribou get  
15 running down roads between snowbanks and can really  
16 have trouble getting off a road in front of -- especially  
17 in front of a logger barrelling down as fast as he  
18 can trying to run the animal down, and these animals  
19 hesitated and came across the road during quiet  
20 hours, and the greater the traffic, the greater the  
21 motion, the more the hesitancy. So, I have said in  
22 my paper, or in an earlier paper, if vehicles are  
23 coming down the road continuously and making motion -  
24 motion is something that caribou perceive as a dis-  
25 turbance -- the greater the activity on the road, the  
26 longer it will take these animals to get across. If  
27 there is a very strong drive to get across the road,  
28 I feel that they will get across the road.

29 WITNESS CALEF: I might just  
30 make a few comments that have occurred to me. You asked



me specifically about Almer's studies. There have been other studies of roads. Just a few comments. One is that salting of the road often attracts ungulates to the road as does the snow clearing. I think Mr. Jakimchuk's people in their studies of winter roads and seismic lines have commented on the difference of use compared with compacted roads and seismic lines on which the snow had been compacted as opposed to roads in which the snow was deep, and I think that there are other studies which also support what Dr. Bergerud is saying about the traffic level, and I would just like to mention that I put in my report as one of the conditions that I think should be imposed on a pipeline or any other development which uses a road and this would also apply to the Dempster Highway, that perhaps traffic could be restricted to certain periods, or even stopped during periods where there is a large amount of caribou movement across the road, and I think that this would help a lot of these problems.

Q Now, we were discussing research this morning and earlier today you were discussing the impact of biologists on caribou. Have you any thoughts, any of the members of the panel, on how further research should be conducted and what I have in mind is whether it should be conducted by a single agency or a combination of agencies and then who that might be? A herd that crosses international boundaries here, and so obviously there are people in two countries studying this herd, we may have reason to recommend a better way of studying these animals as they range over their





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territory.

WITNESS LENT: Certainly I think that there is a need for greater co-ordination in the future and I think we are talking about 1972 which was a peak year for biologists, then I think there was probably some wasted effort and certainly a good deal more information could have been gathered by better co-ordination between various government agencies and private parties at the time. There have been some efforts made to get a long range, co-operative effort and co-ordination between individuals and parties on the Alaskan side and the Canadian side and it's of regret that these efforts so far have not been too fruitful. I hope that they will be pursued further.

Q But would you recommend that there be an international equivalent of a Wildlife Service to do any further studies, or have you any thoughts about that?

A No, I wouldn't recommend an the International Wildlife Service -- but I would recommend a pretty firm agreement established at a relatively high level in respective agencies to promote this sort of co-operation. At present it's-- whatever is going on, I think, is operating at more the field biologist's level, and it needs to be considered at a higher level in the bureaucracies.



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1 Q Are those your thoughts  
2 as well, Dr. Calef?

3 WITNESS CALEF: Well, I've  
4 one comment. It's interesting that everyone always  
5 assumes that duplication of effort is bad, and I  
6 suppose in a completely objective world this is right.  
7 However, some interesting things have come out of  
8 for example the aircraft disturbance studies in which  
9 all three groups who were studying the Porcupine herd  
10 did independently, and we find some differences in  
11 the responses which we measured, and it's an interesting  
12 question about why these differences might have arisen.

13 The second thing that I would  
14 note is that these sorts of studies are probably at  
15 this point more to be considered as a monitoring effort  
16 than as conditional research that would go on before  
17 a decision was made on the project and I would think that  
18 he'd want to get as much input from management agencies  
19 and so on as possible, in the design of studies that  
20 would be looking into the effects of harassment.

21 Q Dr. Bergerud, have you  
22 any thoughts on that?

23 WITNESS BERGERUD: Well, I  
24 had some -- I made a statement in my transcript on that.  
25 I would think it's going to be chaos trying to manage  
26 this population in the future if there is two Terri-  
27 tories and Alaska trying to do this. So I can't see how  
28 management is ever going to succeed, especially at the  
29 harvest level, which is what most of caribou management  
30 is, if we try and manage the harvest unless there is



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1 some kind of international organization that is going  
2 to work co-operatively to manage this herd. I certainly  
3 think that the Federal Government should get involved  
4 with Alaska in coming to grips with this problem.

5 Q Now, Dr. Bergerud, turning  
6 to another point in your evidence, you have told us  
7 this morning that with regard to some herds which have  
8 not crossed highways during a period of time, that they  
9 begin to cross highways again if the stresses on them  
10 diminish, and cross at the same point. What I'm inter-  
11 ested in is whether you have any opinion as to whether  
12 a much reduced Porcupine caribou herd, if its range  
13 were reduced and it were cut off either from part of  
14 its winter range or from part of the North Slope,  
15 would recover in the sense that it would expand back  
16 into that part of the range that it formerly occupied.  
17 Say the herd were cut, for example, in half, --

18 A The range or the numbers?

19 Q That they were precluded  
20 from using a portion of their range. Let's take, for  
21 example, the calving grounds as being the one that  
22 you consider to be very important, and because of that  
23 and access or whatever caused a decrease in their  
24 number. If they were to increase in their number, in  
25 your opinion would they make an attempt to re-invade  
26 their former calving grounds?

27 A Yes, that's what I think  
28 the evidence showed in North America, that as herds  
29 increase they move out. People make carrying capacity  
30 estimations on where we are today and how much of the





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1 range they're utilizing and then all of a sudden the  
2 herd is using a whole new area. They forecasted declines  
3 of the Nelchina herd ever since Dr. Leopold and Fraser  
4 Darling went up there in 1953. They were always basing  
5 this on where the caribou were now, and as the caribou  
6 grew in numbers, they increased their range and they  
7 increased their range, and then of course you finally  
8 get to the point where they might go to another sub-  
9 population. So that my experience is very limited  
10 in Newfoundland because caribou are just coming back  
11 now, but they're starting to use their old routes.

12 In Labrador when Elton studied  
13 the caribou and wrote his famous book, "Mice, Voles and  
14 Lemmings", there were lots of caribou and then they  
15 disappeared, and a great deal of this was shifts in the  
16 population, moving, so that as populations increase,  
17 they will occupy new ranges and I have some evidence  
18 that they will even cross roads even though the animals  
19 that must have the tradition originally are no longer  
20 there in the population.

21 Q And do you feel if they  
22 were cut off permanently from something as important  
23 as their calving ground, because of man's intrusion  
24 into it, that this Porcupine herd would maintain its  
25 levels by choosing an alternate calving grounds?

26 A I think we're using anim-  
27 als to predict where is the best range. They tell us  
28 from their behaviour where is the best place to be.  
29 These animals have evolved through long periods of time  
30 to calve at that place, and I'm doubtful that the



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1 second-best place is that good. Now, if the calving  
2 ground has evolved because of a wolf question, you  
3 might artificially create a second calving ground that  
4 would be just as good by reducing the wolves through  
5 management.

6 Q Is that the opinion that  
7 is shared by the other two members of the panel?

8 WITNESS LENT: Well, since  
9 Dr. Bergerud has used the example of the Nelchina  
10 population, I want to emphasize again that despite the  
11 radical fluctuation in size, which that population  
12 has undergone, the calving grounds has never significant-  
13 ly shifted.

14 THE COMMISSIONER: Let me just  
15 interrupt, if you will allow me to. All three of  
16 you have concurred in the opinion that the calving  
17 grounds of the Porcupine herd have been chosen by the  
18 herd for reasons that are important to them. Two  
19 reasons, the freedom from wolves and the freedom from  
20 insects for a period of a few weeks at birth and  
21 following birth. Now, Dr. Bergerud said this morning  
22 that something about he doesn't know if there is a  
23 second-best habitat that will be adequate, and what  
24 we're concerned with here is whether development on  
25 the North Coast would eliminate the calving grounds  
26 for this herd.



You talk about exterminating the wolves in some other area and presumably trying to persuade the caribou to calve in that area, but that is all, it seems to me, quite speculative, and not likely to get us very far. That was where you left it, Mr. Bayly, and I am only intervening because I -- it seems to me that that is a purely speculative thing, isn't it? Whether you could artificially, by exterminating the wolves, presumably doing something about the insects -- it is difficult --

A Oh, yes, sir, there is a possibility. I am certainly not arguing that they had picked the best habitat and that is where they ought to be, but if things have to change, we have got to try and manage what we have got.

Q Well, if the governments of the United States and Canada authorize the Arctic Gas pipeline across the North Slope, and then an oil pipeline, and then a road -- let us say, that your prediction, Dr. Bergerud, this is likely to lead to the elimination of the calving ground and some diminution of the herd. I may not be doing justice to you, but that is what the thrust of your opening remarks was, then certainly people like you three would be saying to the government, "All right, let's see if they will calve over here and we will develop a new technology to prevent the insects from harassing them and we will send people to shoot or poison the wolves " and you might create a second best habitat that just might work, but it is all pretty "iffy", isn't it?





A Yes sir, as far as I am concerned.

WITNESS LENT: I would also like to add, sir, that when I testified before Christmas I mentioned what I believe is a third reason for the calving grounds being where they are, and that is the phenology of the vegetation, the fact that the vegetation is greening out in these areas at the precise time when calving is occurring in these areas and so I believe there are nutritional advantages to the calving grounds in question in Arctic Alaska.

THE COMMISSIONER: Yes, I remember you saying that -- what was that expression, "greening out"?

A Vegetation -- new growth is occurring. In other words, it is rather a misconception that new growth would be necessarily later as one goes farther north. That is a generalization which is sometimes true, but in the case because of snow patterns, because of climatic differences, in the areas of the calving grounds, the greening out, the new growth is occurring at about the time of calving.

THE COMMISSIONER: Earlier on the coast than in the Interior --

A Not right on the coast, but in the foothills, the southern part of the coastal tundra. Not right on the immediate coast.

THE COMMISSIONER: Right, I follow you, and that would be -- Dr. Bergerud said this



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1 morning that he had not seen that the vegetation  
2 in the calving grounds seemed different to the vegetation  
3 utilized by the caribou elsewhere, and yet you are  
4 really saying that in the case of the Porcupine herd  
5 this is an exception.

6 A Yes, in the case of the  
7 two Arctic Alaska populations.

8 MR. BAYLY: As a panel do you  
9 feel that there is a point below which the population  
10 of the caribou herd should not be allowed to diminish  
11 because there may be a point that if it diminishes  
12 below a certain number it will never recover, or can  
13 never recover its present size? In other words, if  
14 it dropped to 20,000, it might never come back to  
15 110,000, but if it only dropped to 70,000, it might  
16 be able to recover.

17 WITNESS BERGERUD: There is a  
18 jargon in our field called the threshold of security.  
19 I don't believe in the threshold of security. I have  
20 started caribou herds with three animals, so I think  
21 that they can come back from anywhere. The big thing,  
22 of course, is in starting a herd with a small group  
23 of animals is whether you can hold them together. Many  
24 introductions fail because everybody heads out in their  
25 own direction. They have got their traditions to  
26 somewhere else. I don't think that there is a minimum  
27 population.

28 Q Dr. Calef?

29 WITNESS CALEF: I would tend  
30 to agree, although there is also a body of theory in



the ecological literature, particularly appropriate to islands which says that the smaller the area that is occupied by species, the more likely it is that they will go extinct, and that this is why, let's say, an island of a given size has far fewer species than an area of a given size on the continent and this theory holds that local populations are going extinct with some regularity and that then they are recolonized by migrants from other areas. This may be over a very long period of time the strategy of the caribou which is to say if the Nelchina herd is low, the Arctic herd is high, and the Porcupine herd is intermediate and the Bluenose herd is something else, and if one should happen to go low, or possibly even extinct, it could be recolonized by immigration from another herd.

So, by this reasoning, the important thing there would be to maintain a certain minimum size in all the populations and hopefully keep caribou at least distributed throughout the Arctic.

Q All right, and do you subscribe to that, Dr. Lent, or do you have any other thoughts?

WITNESS LENT: Well, of course, to even attempt to answer that question you have to make certain assumptions about the persistence of the causes of the decline. Obviously if the causes are going to persist<sup>to</sup> any degree, then it is less likely that you will get an increase.





Q I realize the introduction of a road that is going to continue may be the preventive factor of any herd increase.

A I think that the only other thing I would add is that we do have, in Alaska, certain relic populations which have never increased to their former abundance. We don't know why. I mentioned, for example, the fact that caribou were, in the 19th Century, abundant in the area of the Seward Peninsula, the Yukon-Kuskokwin Delta. We still have very small relic groups wandering around in that vast area, but at least to date we have had neither an influx of caribou from other large populations nor a significant increase in the size of those relic populations. We don't know why.

Q I assume that you would have to study predation from all causes and disease as well as the size and acceptability of the food supply and the habitat before you could determine what the causes might be for that?

A Yes, that is right, and of course, looking at the overall value of wildlife in the state, these relic populations are very minor and the management agencies, at least, haven't been able to look at them in any depth.

Q All right. Now, I gather, Dr. Bergerud, that one of your basic points is that caribou will adapt to certain of man's activities, that there is a time element in this so that they can evolve themselves to meet certain stresses, they may require a period of time that we, in some cases, can't assess.



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1 WITNESS BERGERUD: Some places  
2 they don't have to adapt, they have this no fear of  
3 man now. I mean they are adapted now to walking by  
4 houses and coming down main streets. You have to  
5 specify what.

6 Q I guess <sup>if</sup> they're precluded,  
7 for example, from using part of their winter range they  
8 must adapt themselves to using other parts. If you  
9 take too much of it out, you may squeeze them all onto  
10 the coast, for example.

11 A That's not quite an  
12 adaptation. They're in the second-best winter range  
13 but they're not doing as well as they should be.  
14 You can't adapt to this winter range if it isn't a  
15 very good winter range.

16 Q All right, so you're  
17 distinguishing between habitat and adaptation to  
18 particular activities and we have to do that in order  
19 to understand.

20 A Well, I guess that's  
21 what I'm saying. I've been talking about adaptation  
22 to man. They are a very highly adapted animal. There's  
23 a lot of people that have said for many years that  
24 they're not plastic, and it's been my big argument that  
25 they are plastic, that they are adaptable; but the  
26 environment -- they have to find the right mix of the  
27 environment to make it, and if the right mix isn't  
28 there within their range, they won't make it.

29 Q All right. Dr. Calef, if  
30 I could take advantage of your being here to turn to



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1 the subject you're now studying in your present  
2 position, and that is wood bison. I understand you  
3 are the person that has been recently surveying the  
4 wood bison herd near Fort Providence.

5 WITNESS CALEF: That's right,  
6 since this April.

7 Q And as I understand from  
8 evidence that was led previously, that this is one  
9 of two herds in North America of the pure strain of  
10 wood bison, as opposed to mixed wood-plains buffalo.

11 A That's what it's purported  
12 to be. That's right, it's the only wild herd, and I  
13 guess the herd in Elk Island would be the only other  
14 existing herd.

15 Q And this herd has increased  
16 from the 16 animals that were placed there a number of  
17 years ago to what numbers at present, according to  
18 your survey?

19 A Somewhere between 280 and  
20 300 animals, including the calves of this year.

21 Q And what sort of condition  
22 is that herd in in terms of the health of the animals  
23 and the condition of the habitat they occupy?

24 A I can't speak for the  
25 habitat. The herd is and has been in a period of  
26 extranatural growth, very rapid growth. It increased  
27 from either 17 or 18 animals in 1963 to the population  
28 which we have now. That's an annual growth rate of  
29 the population of 24% per year. I have looked at the  
30 past surveys and the surveys that have been done in





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1 the past indicate that the population has maintained  
2 its growth rate almost throughout the period, and there  
3 are currently -- the calves that are currently alive  
4 in that herd would indicate a growth rate of 24.8%,  
5 so I expect maybe one or two may die between now and  
6 spring.

7 Q And --

8 A So this indicates the  
9 habitat is certainly able to support those animals  
10 right now.

11 Q -- have you examined the  
12 Foothills plan for running a supply line to Yellowknife  
13 and where that line might be in relation to the habitat  
14 presently occupied by this herd?

15 A No, I haven't.

16 Q All right. Do you feel  
17 that if this herd continues to grow, that its habitat  
18 -- the habitat that it's using will have to grow as  
19 well?

20 A Yes.

21 Q And is there habitat  
22 available in the area for it to continue growing either  
23 at the present rate, or at least at a healthy rate?

24 A I think there are, yes.  
25 Again I said we haven't done detailed work on the  
26 habitat, but these animals are using all the open  
27 areas -- meadows and dried up lakes and the shores of  
28 lakes which partially dry up, and there are lakes  
29 like this both to the north and east of where the herd  
30 is right now. The herd has continued to use the same



Calef, Lent, Bergerud  
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1 area that they were introduced in for the entire period  
2 that it's been there.

3 Q They are on the south  
4 side of the road from Fort Providence to Rae-Edzo, is  
5 that correct?

6 A That's right.

7 Q And does this habitat  
8 that they could use if they expanded, extend to the north  
9 side of that road?

10 A Yes, it does.

11 Q At present I understand  
12 they're not using any of the potential habitat on the  
13 north side of that road.

14 A I think there has been a  
15 few sightings of animals crossing the road. There is  
16 one lake which is right along the highway where we've  
17 seen a few individuals; but the main herds with the  
18 calves are quite a distance from the road, 30 or 40  
19 miles from the road.

20 Q All right. Now you have  
21 also been studying the buffalo herd in the Fort Smith  
22 region, is that correct?

23 A That's right.

24 Q And that herd, I under-  
25 stand, is a mixture of wood buffalo and plains bison.  
26 Is that correct?

27 A Well, they're both bison,  
28 yes.

29 Q Are they two different  
30 sub-species, or --



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1 A Well, this is something we  
2 would hope to look into. There are supposedly quite  
3 a few morphological and behavioural differences between  
4 the two sub-species. They are recognized as sub-species  
5 in the literature and the animals which originally  
6 inhabited Wood Buffalo National Park would have been  
7 placed in the wood bison category, and the animals from  
8 Wainright would be considered plains bison, and they  
9 were the ones that were introduced into the park and  
10 the animals that are there now are hybrids between the  
11 two.

12 Q All right, and would that  
13 be similar to the difference that is made, the distinction  
14 that is made between caribou and reindeer?

15 A It would except -- as long  
16 as you're speaking of wild reindeer. Both of these are  
17 wild animals.

18 Q Now, is the herd that  
19 is near Fort Providence a healthy herd, or does it  
20 have -- I understand the various bison are often have  
21 anthrax and brucellosis.

22 A Yes, I forgot you asked  
23 me about disease in terms of the Providence herd.  
24 The Providence herd is supposedly free of tuberculosis  
25 and brucellosis. These diseases are endemic to, both  
26 of them are endemic to the populations. Both in the  
27 park and on the Slave River lowlands and they're  
28 present in moderately high levels, I would say it's  
29 on the order of 30-40% or higher of the animals have  
30 one or both of those diseases.





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1 We don't know for certain that the animals on the bison  
2 sanctuary, that is the pure wood bison, are disease-  
3 free, because all the animals were originally considered  
4 to be disease-free, but some of the ones that went to  
5 Elk Island were later found to have it. Now whether  
6 they contracted it there, or whether they actually  
7 had it and it wasn't detected, I don't know. If the  
8 latter case, then presumably there's a possibility that  
9 there would be T.B. and brucellosis in the sanctuary.

10 Q Are these animals subject  
11 to harassment in a similar fashion to the caribou, to  
12 airplane and motorized toboggan harassment?  
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A Yes, they are subject to harassment by hunting which is conducted mostly by snowmobile and there is a licenced outfitter in the area who uses a bombidier.

They are subject to harassment by the Game Department which has rounded up these animals since 1965 for innoculation against anthrax and sometimes this round up has gotten as much as 800 animals. The animals in the park, incidentally, are also rounded up. They have been surveyed periodically from aircraft and presumably private pilots also go in and look at them occasionally, so they are subject to harassment.

Q Now, is this Hook Lake population, or Fort Smith population in a state of decline or increase?

A Yes, it is.

Q Which one?

A Pardon me?

Q Decline or increase?

A Oh, sorry, I thought you just said decline. Yes, it is in a period of decline.

Q And have you formulated any opinion as to whether that has anything to do with hunting and other forms of harassment?

A This is the research that I am engaged in right now and I haven't got enough information to form any opinions yet but I am considering all of the things that you mentioned. Disease, harassment, hunting and predation are the



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likely candidates.

Q And I take it with regard to the herd near Fort Providence, no hunting is permitted?

A That is right.

Q But they might be subject to the other stresses that you mentioned?

A I would say to a lower extent. Certainly there have been no roundups in the sanctuary herd.

MR. BAYLY: Those are all the questions that I have of this panel. Thank you very much, gentlemen.

CROSS-EXAMINATION BY MR. VEALE:

Q Dr. Calef, there has been a certain amount of reference to the third alternative route on the Interior and I understand that it was originally proposed by yourself and that you communicated this proposal to Arctic Gas, is that correct?

A That is right. It has been so long ago that I am not -- my memory is failing me a little bit here but it seems to me that originally, when this project was originally conceived, the Interior and Coastal route were thought of as being corridors of possible pipeline routes and that is exactly the way in which I still think about this project. When I speak of a coastal route, I am not addressing myself specifically to the proposal that is here right now. It is any pipeline route that would, say, go below the 1,500 foot contour level on the foothills all the way out





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to the coast, and when I talk about an Interior route, it is not the one that is necessarily before this Commission right now, but a corridor that would run somewhere along or near the Porcupine River. It seems to me that there was a route proposed originally that went substantially south of the Porcupine River, because at that time the pipeline route was supposed to go further south than it does now, near McPherson, and it was supposed to continue down the southwest side of the Mackenzie River and cross the Mackenzie River at Sans Sault Rapids. So, I think originally that this route was an actual proposal of the pipeline company itself. This would be Gas Arctic that I am speaking of.

So, I just revived the route and showed that a more southerly route in the Yukon didn't necessarily have to be dropped just because a westside route of the Mackenzie was dropped.

Q Well, do you still take the position that the Interior route, so-called by Arctic Gas, is less preferable than the Interior route that you talk about, and that Interior route, I understand to be one that crosses the Porcupine River somewhere at the Yukon-Alaska border and then cuts across and actually follows the location of the Dempster Highway?

A Yes, that is right. I still think that it is preferable, but not particularly for reasons that it would have less effect on the caribou. There are a lot of other reasons in my consideration.



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Q Could you elaborate those reasons?

A Yes, I think the first advantage is that it would keep it out of the proposed Canadian Arctic Wildlife Range, as it has been proposed right now. The southern boundary of that proposed range is the Porcupine River.

The second thing is, this is my impression, that the country south of the river is used less by the native people from Old Crow than the area close to the village where the route runs now and the Old Crow Flats which is north of the village.

The third reason is that there has been a lot of exploration work on the Eagle Plains and the Keel Mountains. There are large numbers of seismic lines, winter roads, drill pads, airstrips, etc., in that area, so, therefore, the aesthetic impact would be less, there might even be some potential for using right-of-ways that are already cleared and already disturbed for laying the pipe and so on. Another reason is that instead of having an interior route crossing one pass through the Richardson Mountains and the Dempster Highway crossing another pass, if you met up with the Dempster Highway on the west side of the Richardson Mountains, then the highway and the pipeline could go through the same pass and the highway could be used for logistics for the construction rather than new roads and the right-of-way itself.

The two things that relate to caribou, we have evidence to indicate that the



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1 animals become more reactive to aircraft as they  
2 approach the Porcupine River. The highest level of  
3 reaction of caribou to aircraft that we noted was at  
4 river crossings. So, if you kept the pipeline twenty  
5 or thirty miles away from the river, you might keep  
6 the line from being associated with the natural feature  
7 that apparently causes stress in the animals.

8 I just might note here that Dr. Lent has reported  
9 similar changes in behaviour of large herds on the  
10 coast which approach rivers and other natural obstacles.

11 Finally, it was my impression,  
12 and this is something that needs to be verified, that  
13 there is more evidence of fire south of the Porcupine  
14 River, and there may be very large areas in there that  
15 were burned, and burned recently, and so in this  
16 respect, they are disturbed, although it may be a  
17 natural disturbance.

18 So, those were my reasons, and  
19 as I said, very few of them had to do with caribou,  
20 but I think that it is worthy of consideration.

21 Q I take it, and you  
22 probably inferred this, that one advantage of keeping  
23 the pipeline and the Dempster Highway together is that  
24 you don't spread the influx of access over a greater  
25 area.

26 A That is right, yes.

27 Q Now, a number of experts  
28 have been asked their preference with respect to routing  
29 and it is my opinion that generally they have stated that  
30 the preference would be for the Fairbanks route without





Calef, Lent, Bergerud  
Cross-Exam by Bayly

the lateral coming down from Inuvik. Now, does your suggestion of this third, or of this second interior route, does that imply that you would favour a Fairbanks corridor with the lateral?

A No.

Q So your position then with respect to the preferable route would be that it go down the Fairbanks route without the lateral from Inuvik?

A I have never said that, but that would be my preference, yes. My preference would be that there would be no pipeline route crossing the northern Yukon anywhere. If there had to be a pipeline route across the Yukon, regardless of which direction it went, I would rather see it go the Interior route, and my preference would be south of the Porcupine and out of the proposed Arctic Wildlife Range.



Calef, Lent, Bergerud  
Cross-Exam by Veale

1 Q So it's stated in your  
2 evidence in chief that you would like to see more  
3 study of the winter range and you've stated that for  
4 the reason that it could affect birth in the spring  
5 and the general survival of the herd, you would like  
6 to have studies of behaviour, diet, and the general  
7 influence that the winter range has on productivity.  
8 Now, does that not cause you some difficulty taking  
9 in mind the fact that the Dempster Highway bisects that  
10 winter range so in a different fashion, I would suggest,  
11 than on the actual interior route that the applicant  
12 selected.

13 A I'm not sure  
14 I understand you.

15 Q The question is this.  
16 You've stated that there is a lack of information with  
17 respect to the effect of winter ranges.

18 A Yes.

19 Q And yet you are now  
20 saying that your preference would be for a route that  
21 would go right through that winter range..

22 A Yes, for the reasons that  
23 I mentioned in my testimony.

24 Q And you don't feel that  
25 the lack of knowledge about the effects of the winter  
26 range doesn't have an influence on your preference?

27 A No, it doesn't because I  
28 feel that we lack knowledge about the winter range. We  
29 also lack knowledge about the calving grounds. For  
30 example, one of the weaknesses which I mentioned this



Calef, Lent, Bergerud  
Cross-exam by Veale

1 morning, the fact that we don't have pregnancy versus  
2 live birth rate data for that herd is an important  
3 gap for making a decision between an interior and a  
4 coastal route. It bears both on what the outcome of  
5 stress on the coast might be, and also the outcome of  
6 stress on the winter range; but maybe I should just  
7 refresh your memory about why I suggested that the  
8 winter range was not quite as critical as the calving  
9 ground on the coastal summer range. The winter range  
10 is something like 10 to 20 times as big. The same winter  
11 ranges are not used in all years, that is to say that  
12 it's by no means certain that if construction were taking  
13 place for two or three years in the Northern Yukon on an  
14 interior route that it would ever encounter caribou on  
15 the winter range. There is winter ranges, many winter  
16 ranges that are a long ways from any given interior  
17 route. They're scattered -- well, essentially anything  
18 south of the Brooks Range is a winter range for that  
19 herd, which is about 90% of the total.

20 The second thing is that the  
21 animals gather much more over the winter range so it's  
22 likely that any activity in any area would encounter  
23 fewer caribou than it would on the coast, or that might  
24 on the coast, and these arguments are all detailed in  
25 my original testimony.

26 So certainly I'd like  
27 more information on the winter range. This business of  
28 wind chill that Dr. Bergerud mentioned is the sort of  
29 thing that we need information on how much variation  
30 there is in calf weight and so on. But I would still





Calef, Lent, Bergerud  
Cross-Exam by Veale

1 stick to my argument with that current state of knowledge.

2 Q Dr. Calef, with respect  
3 to the monitoring that you have recommended on a con-  
4 tinued basis for that herd, can you give us some  
5 indication of the number of biologists and the annual  
6 cost of that monitoring?

7 A I think I could give you  
8 ball park estimates. If we can go back to Dr. Berger-  
9 ud's testimony, which I said is the sort of thing that  
10 I had in mind for the surveillance that we need at  
11 least to pick up the demographic changes in the herd.  
12 I would say you need approximately four to six people  
13 devoted full-time to this project.

14 Q Are you speaking now of  
15 four to six biologists, or two biologists and four helpers,  
16 or --

17 A Well, I don't know whether  
18 they all need to be professors or senior Canadian Wild-  
19 life Service people or whatever. I think you need a  
20 couple of senior people and competent field people;  
21 whether you call them technicians or researchers doesn't  
22 matter as long as they're competent and are willing to  
23 make the studies in the field. I would say you'd need  
24 something on the order of -- just thinking back to my  
25 studies and the sort of budgets that Mr. Jakimchuk's  
26 group worked with -- I would say something on the  
27 order of \$100 to \$200,000 a year, I would say, on a  
28 continuing basis. It might be -- you see, I don't think  
29 we need a census every year of the herd; I think every  
30 other year would probably be good enough, particularly



Calef, Lent, Bergerud  
Cross-Exam by Veale

1 if we detected a change in the population say on the  
2 second year, then we could do it the third year to  
3 check up. But that would be my ball park estimate.

4 Q Would you also indicate,  
5 Dr. Calef, we've had discussions about how the time  
6 involved in predicting a trend and obviously it depends  
7 on how many -- what the mortality would be in a parti-  
8 cular year, but Mr. Jakimchuk has expressed, I think,  
9 a three-year period as being enough time to see a trend  
10 established, given certain conditions. What are your  
11 feelings on that?

12 A I would agree with that.  
13 I would say that if we had a census that indicated a  
14 decline in the population greater than 10%, which I  
15 think is roughly our level of uncertainty in census,  
16 if everything goes well then we would verify it the  
17 second year and we would already, because we have  
18 these other demographic parameters, we would already  
19 suspect that there was a reason for decline or  
20 increase because we'd seen an increase or decrease in  
21 the birth rate, or an increase or decrease in the  
22 mortality rate, and so we would look again. Perhaps  
23 we would intensify our sampling on the births and  
24 deaths and we would detect, I would think, within three  
25 years.

26 Q Do you feel the same  
27 about that, Dr. Bergerud?

28 WITNESS BERGERUD: Three  
29 years sampling? Well, I think it's the way of life of  
30 populations, they go up and down. I studied a



Calef, Lent, Bergerud  
Cross-Exam by Veale

1 population, I had data from 15 years and eight years  
2 they went up and seven years they went down and the  
3 net rate was that they were increasing at 3.3% a year.  
4 So I don't understand this trend. It could go down for  
5 three years and then go up the fourth year, and so I  
6 think that you figure out what you need to know from  
7 your percent calves. Is 15% the number of calves that  
8 it takes for the population to increase, or is that  
9 the percent it takes to stabilize? And you find that  
10 out each year and you say, "This year it went up and  
11 this year it went down," and you're on top of it all  
12 the time. If you've got a calf crop, 10%, 10%, 10%,  
13 it's going down, it's going down, it's going down. So  
14 I don't understand the idea of trends. The Porcupine  
15 herd could get up and move down to the 40 Mile herd  
16 tomorrow and there would be quite a few less, and that  
17 would be a sizeable decline but that wasn't a trend,  
18 that happened pretty quick.

19 Q It would be nice to  
20 know it happened instead of just throwing up our  
21 palms in issue about some of these other herds.

22 A It certainly would.  
23 Oh, I believe in aerial census. I think that, I don't  
24 know if you can count these animals -- do you want  
25 to count them every three years?

26 WITNESS CALEF: Every second  
27 year.

28 WITNESS BERGERUD: I don't  
29 think I could count them every second year and predict  
30 a trend. I count them this year and there's 90,





Calef, Lent, Bergerud  
Cross-Exam by Veale

1 90,000; and I count them two years from now and there's  
2 70,000, and I don't know whether that's true or not.  
3 If I put 95% confidence limits around my 70,000 and  
4 my 90,000 and they overlap and I can't demonstrate to  
5 any statistical person that a decline has really  
6 happened. You could count them every year and you  
7 could start making dots on a regression line, and this  
8 is a statistical test in which you show the slope of  
9 your line is significantly different than zero, and  
10 that population is really going down. That's where two  
11 adjacent counts aren't significantly different.  
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Calef, Lent, Bergerud  
Cross-Exam by Veale

1 But many years add the weight  
2 of a slope to your knowledge, so that I think the  
3 best you'd do in caribou work is maybe count them every  
4 five years.

5 WITNESS CALEF: I would  
6 just like to disagree with that a little bit. The  
7 type of thing that I am speaking about are the sorts  
8 of declines and decreases which I mentioned in my  
9 original testimony where we are talking about 90%  
1 declines over a five year period. I think that it  
11 would be a little more dramatic than Dr. Bergerud  
12 suggests, and I think that particularly with a  
13 very major precedent-setting project like this going  
14 into the north, that we would want to know why that  
15 decline took place to document it -- or an increase.  
16 We don't need to use the word "decline", and whether  
17 there were big immigrations or emigrations of the  
18 type he suggests. I think that we should know this and  
19 since we do know for some populations that there have  
20 been 90% changes in just a few years, I am sure that  
21 we could detect those.

22 Q Dr. Lent?

23 WITNESS LENT: Yes, changes of  
24 that magnitude and rapidity have caused problems in  
25 Alaska because they weren't being monitored frequently  
26 enough and hunting pressure -- hunting regulations  
27 were kept constant for several years in a row and  
28 the hunting take does not necessarily decline proportion-  
29 ally to the population. It can continue at a high level  
30 while the population is declining rapidly, and if you



Calef, Lent, Bergerud  
Cross-Exam by Veale

1 don't detect that in some way, it doesn't necessarily  
2 have to be from an annual census, aerial photo census  
3 of the whole population every year, but you have to  
4 have some indicators to detect that decline, and you  
5 can't necessarily detect it from the harvest.

6 WITNESS BERGERUD: I would  
7 like to say one more thing. If I go out and  
8 count those caribou this year and there's 5% calves,  
9 they have declined, and I have not made any census. I  
10 think that we can use the per cent calves, or per cent  
11 yearlings in the populations and if you get a good  
12 knowledge of what is up and down in that population,  
13 you'll have it every year, whether the population  
14 has gone up or down. I can't believe that any  
15 caribou population in North America that is increasing  
16 with a 5% calf crop. They are going down. So, I  
17 think that the monitoring, I think that the way that  
18 Skoog did it with the Nelchina, he counted them in  
19 one year and he didn't count them for many years later.  
20 He demonstrated by building his, by having precise  
21 knowledge on deaths and births, he extrapolated between  
22 those two counts and arrived at the census figure that  
23 he got independently by an aerial census. I did this  
24 in Newfoundland. I kept track of the Mealy Mountain  
25 caribou herd for several years. I counted them only  
26 three times. I estimated what the population was every  
27 year, based on births and deaths and drew a line and  
28 it met up with what I later counted. Do you understand  
29 what I am saying?

30 Q We have exhausted that,





Calef, Lent, Bergerud  
Cross-Exam by Veale

do you have anything to add, Dr. Lent?

WITNESS LENT: Normally, that type of data is sufficient, but what has certainly occurred in Alaska is that we've had major egresses, that is, in movements of animals from one population to another. That type of phenomenon is not detectable from birth rate data, and these movements have been between game management units, in other words, you have one unit with a certain set of harvest regulations and another unit with a different set, and when you shift many thousands of animals between those two units, this can result in management problems.

WITNESS BERGERUD: I would like to say one thing, if I could, because Dr. Calef is asking me why I said what I said as point one on page 18 if I don't believe in annual counts.

So, I guess, looking at my point there, you people with the Porcupine herd, and I guess with the Arctic herd, have come up with the technique of taking aerial pictures of these animals in the post - calving aggregation. Now, I don't know how expensive that is, but when I wrote this point I thought this was a pretty good technique and not too expensive. I mean, if you people can fly over this herd and take a picture of them every year and know how many there are, it is certainly the thing to do. When I talk about counting them every five years I am talking about thousands of dollars on hundreds of hours in the air flying lines. If this



1 aerial technique is good and we can put pinholes  
2 through every caribou on a photograph and count them,  
3 we certainly ought to do that.

4 Q You gentlemen mentioned,  
5 not in so many words, but what I think is referred to  
6 as the law of diminishing returns, and that is that  
7 I think it has been stated that when a population  
8 goes into a decline that with respect to hunting a  
9 law of diminishing returns applies and that gives the  
10 caribou some breathing space to build back up. Now,  
11 do you gentlemen agree with that?

12 A The law of diminishing  
13 returns for people? I disagree strongly if you  
14 think that native peoples -- the law of diminishing  
15 returns means to me that people give up the hunt as  
16 the population goes down, and they don't give up the  
17 hunt. As the population goes down -- I mean, if people  
18 really need caribou, they stay in the country longer  
19 and they work harder and the law of diminishing returns  
20 does not work for native peoples in my experience.

21 Q Do white people have  
22 that problem to?

23 A Well, no, white people  
24 usually can be regulated and I have dealt with very  
25 few people that have really needed the caribou. We have  
26 always, when we were, in Labrador, when we are dealing  
27 with the Nascoopi and the Montagnais Indians,  
28 dealt with a completely different problem than with  
29 the people living in Happy Valley who can charter a  
30 Cessna-185 and whip in there and spend more money on the



Calef, Lent, Bergerud  
Cross-Exam by Veale

4 charter than the caribou meat is worth.

5 Q Well, Dr. Lent, is that  
6 your opinion as well?

7 WITNESS LENT: Well, I am  
8 not sure, I kind of lost what was being said there, but  
9 I was trying to say just a few minutes ago that this  
10 law of diminishing returns, as I think you mean it,  
11 does definitely not apply, that, for example, in the  
12 Nelchina population we can document -- it has been  
13 documented very precisely and actually increasing  
14 harvest during a period of population decline, in  
15 part due to increased effort and increased use of  
16 180's and other expensive gadgetry as Dr. Bergerud has  
17 referred to.

18 Q Dr. Calef, perhaps  
19 you could address yourself to this question. I think  
20 that the Environmental Protection Board has stated that  
21 a 2,000 foot altitude is what is required to reduce  
22 your impact on caribou herd and Dr. Bergerud has  
23 stated 1,000 I believe in his evidence this morning.  
24 Now, what is your comment on that, Dr. Calef?

25 WITNESS CALEF: Well, I  
26 am not sure that you are correct in either of those  
27 figures, I mean, in attributing those figures to either  
28 of the people that you did.

29 Q Well, have I stated it  
30 improperly, is that what you are saying?

A Yes. I am not sure that  
the E.P.B. recommendation was 2,000 feet -- and did  
you say a thousand feet this morning -- well, okay, I





Calef, Lent, Bergerud  
Cross-Exam by Veale

1 guess I will just --

2 Q Well, I assure you that  
3 the E.P.B. did take that position quite clearly in  
4 their evidence.

5 A Okay. I said in my  
6 testimony that I think in all cases where we don't  
7 have very reliable data, that we must err on the  
8 side of caution. My own studies which were very similar  
9 to the results obtained by Elmer DeBock of the  
10 Canadian Wildlife Service and quite similar to Dr. Klein  
11 in Alaska on the reaction of caribou to aircraft indicate  
12 that somewhere between 500 and 1,000 feet in level  
13 flight, most very strong escape reactions, or panic  
14 reactions in caribou are eliminated. I think this  
15 means that therefore you have eliminated most direct  
16 harm to caribou. Therefore, I would put a limit of  
17 1,000 feet on the animals to eliminate direct immediate  
18 harm to the animals over most periods of the year.  
19 There may be a couple of periods where this wouldn't  
20 be enough, and that would be the calving grounds and  
21 the post-calving aggregations. To eliminate all  
22 harmful reactions, all behavioural responses and  
23 physiological excitement and so on, I am not sure how  
24 much difference going from one to two thousand feet  
25 would make. I think if you could put on and enforce,  
26 and this, of course, is the big problem, is enforcement,  
27 a 1,000 foot elevation, you would have gone a long  
28 ways towards eliminating harmful effects; two thousand  
29 feet would be better.  
30



Calef, Lent, Bergerud  
Cross-Exam by Veale

1 Q Dr. Bergerud, I don't  
2 believe that you've indicated a specific routing  
3 preference other than that between the interior and the  
4 coastal route. If you have, tell me, but you're aware,  
5 of course, of the alternative Fairbanks route, and  
6 what is your preference with respect to the coastal,  
7 interior, and Fairbanks route?

8 WITNESS BERGERUD: I guess  
9 you want to get a lot of people on the side of the  
10 Fairbanks route. I have no expertise in this area.  
11 I have to go on what other people tell me, and it  
12 certainly sounds reasonable to me to keep the trouble  
13 in one spot, and avoid the caribou population. So I  
14 would certainly, based on the fact that this line is  
15 following a line that is already in existence, and  
16 going down a highway, I think by itself that that is  
17 the way to go, surely.

18 Q In your evidence you've  
19 indicated your disagreement with Mr. Jakimchuk in that  
20 you feel that the calving and post-calving aggregation  
21 are the most critical factor, as opposed to migration.  
22 Have you specifically directed your mind to Mr. Jakim-  
23 chuk's table, his route preference table? Do you agree  
24 with that table or do you disagree with that table?

25 THE COMMISSIONER: Well, ob-  
26 viously, given what he said earlier, he must not be  
27 in agreement with the table.

28 MR. VEALE: Yes, that was  
29 my assumption, Mr. Commissioner, as well, but there is  
30 a distinction, I believe, because one is based on



Calef, Lent, Bergerud  
Cross-Exam by Veale

1 the difference about what is the most susceptible  
2 time and critical time and the other is based on a  
3 number of other considerations.

4 THE COMMISSIONER: Very well.

5 A Well, I don't have  
6 the expertise of Jakimchuk with this population and I  
7 think some of the things in that table are dealing  
8 even with other species and what would be good for them  
9 but I disagreed with that table. My feeling when I  
10 read Dr. Calef's testimony was that he had hit on the  
11 key point. I felt that that was a strained table.  
12 There was a difficulty there in a real search to make  
13 that <sup>weighted</sup> towards the coast, and I disagree with it.

14 MR. VEALE: Q Dr. Bergerud,  
15 you've also stated that you would prefer to have the  
16 Federal Government responsible for the herd. In your  
17 evidence you indicated because we could expect better  
18 expertise than with the Yukon Territory as sole  
19 administrators. Now the facts, as I understand, are  
20 that all the funding for the Yukon Territory Game  
21 Branch comes from the Federal Government, so they in  
22 fact control the administration of that herd today.  
23 So I take it that your consideration here is one of  
24 jurisdiction. You'd rather have the federal jurisdiction  
25 involved with that herd rather than a number of isolated  
26 jurisdictions, territorial jurisdictions.

27 A Yes, I would like the  
28 bigness there. I also think that the Federal Government  
29 brings more expertise in the calibre of their scientists,  
30 and I think that local pressure groups are much more





Calef, Lent, Bergerud  
Cross-Exam by Veale

1 successful with local governments, and that good  
2 game management decisions are often lost because of  
3 politics in the back yard.

4 WITNESS CALEF: That's something  
5 that I've been wanting to mention all along, this  
6 management situation.

7 THE COMMISSIONER: As an  
8 employee of the Territorial Government?

9 A I said before that I'm  
10 not here as an employee, and I won't defend or accuse  
11 them of anything. No, but the management situation  
12 of the Porcupine caribou really quite amuses me. The  
13 very idea of having management, it's lack of management,  
14 it's non-managem<sub>e</sub>nt of the Porcupine herd. In Alaska  
15 there is no hunting season and no bag limit for anyone  
16 north of the Yukon River, which is essentially the  
17 range of the Porcupine herd in Alaska. It's open  
18 year-around, that's right. In the Yukon Territory  
19 there is a short season for sport hunters with a bag  
20 limit of one animal. For native people there is no  
21 season and no bag limit. In the Territories, the  
22 bag limit is five per licence-holder, with no season,  
23 and the native people have no season, no restriction  
24 on bag limit, and are allowed to sell the meat commer-  
25 cially in the Territory, and also north of the Yukon  
26 in Alaska anyone, native or non-native, is allowed to  
27 sell the meat as well, as long as they sell it north  
28 of the river. So you can see it shows you what a  
29 misnomer "game management" in the north is today. If  
30 the herd started to decline, who should stop hunting



Calef, Lent, Bergerud  
Cross-Exam by Veale

1 and who should it be? Whose bag limit should be  
2 changed? Should it be native or non-native? Should  
3 there be seasons put on, and if one jurisdiction does  
4 it, what compunction is there for the other ones to  
5 follow? Hopeless situation as it exists right now.

6 MR. VEALE: Q Dr. Lent, you've  
7 indicated your preference as between the coastal and  
8 the interior route for the interior route, based, I  
9 assume, on the impact on caribou for pipeline-related  
10 activities, and you've indicated that the calving  
11 ground is the crucial area. Is that correct?

12 WITN BBS LENT: That's right,  
13 except I find it very difficult in my mind to separate  
14 the caribou from what I consider the general wilderness  
15 values of the coastal area.

16 Q Now, you've also in your  
17 evidence talked with some pessimism about the ability  
18 to control the impact of the use of roads, and that  
19 goes back to your wilderness character, I presume.  
20 Now, at the time of giving your route preference, were  
21 you aware that the three access routes from the Dempster  
22 Highway to the interior route were directly related to  
23 the construction of a pipeline? In other words, that  
24 they do not exist at this point, they were created  
25 for logistic purposes.

26 A No, I wasn't aware of  
27 the details. I was aware vaguely of the routes.  
28 At least some of them were relating to the pipeline.

29 Q Well, what I'm driving  
30 at at this point is that we appreciate the difference



Calef, Lent, Bergerud  
Cross-Exam by Veale

1 between the coastal route because the animals are more  
2 susceptible to disturbance than they are on the winter  
3 range, and during migration; and what I am suggesting  
4 is that<sup>there</sup> will definitely be an increase in access  
5 associated with the three access routes to the interior  
6 line, and that it is conceivable that access problems  
7 may in fact result in greater disturbance even though  
8 your distinction applies between the calving ground and  
9 the wintering ground.

10 A Well, first of all I  
11 have to accept your opinion that it would definitely  
12 lead to greater access, not having enough knowledge of  
13 what's probable and what's possible, that is so far in  
14 Alaska we've been able to prevent public access on the  
15 haul road and establish closed, corridors closed to  
16 hunting along the corridor, at least along the new  
17 portions of the corridor. So assuming -- and this  
18 seems to be contrary to what you're assuming -- these  
19 were done and that would certainly alleviate a great  
20 deal of the problem. Assuming that these weren't done  
21 I would agree that there are very serious implications.  
22 Again it comes down to weighing these, probably in terms  
23 of local implications, that is to people living in that  
24 area I can well envision that the results would be more  
25 unfavorable; but in terms of the whole population and  
26 ecosystem and well-being of the population, I would still  
27 feel that the potential for damage is greater with  
28 regard to the coastal route.





Calef, Lent, Bergerud  
Cross-Exam by Veale  
Cross-Exam by Hollingworth

1 There was quite a bit of waffling in there.

MR. VEALE:

2 That's all right, we've  
3 heard a lot about that.

4 THE COMMISSIONER: Well, I  
5 think we'll adjourn for coffee.

6 (PROCEEDINGS ADJOURNED FOR A FEW MINUTES)

7 (PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

8 THE COMMISSIONER: We'll come  
9 to order.

10  
11 CROSS-EXAMINATION BY MR. HOLLINGWORTH:

12 Q Doctors Lent and Calef,  
13 and I have some for you too, Dr. Bergerud, but  
14 referring to Doctors Calef and Lent I haven't had the  
15 opportunity of reading the December 18th transcript.  
16 It wasn't here that day and I can't seem to find it  
17 in my library, so if I do ask you questions that were  
18 asked of you then, please bear with me. I'll try and  
19 be brief.

20 Dr. Calef, what's your view  
21 of a no-hunting zone on either side of the pipeline?  
22 Do you feel it would be desirable?

23 WITNESS CALEF: Yes, I do  
24 just on general principles. I think it also ought to  
25 apply to a highway. I'm not sure that the no-hunting  
26 zone along the pipeline right-of-way would be as impor-  
27 tant as hunting restrictions on the pipeline personnel.  
28 Now, for the reason that for a good part of that  
29 country access is so easy with seismic lines and snow  
30 machines just right on the tundra or on the mountain



Calef, Lent, Bergerud  
Cross-Exam by Hollingworth

1 ridges themselves.

2 Q What about during the  
3 later times, though, during the operations phase of the  
4 pipeline? Don't necessarily restrict your answer to  
5 the North Slope.

6 A Well, I would say the  
7 most important thing would be to restrict public access  
8 to the pipeline right-of-way and have -- if you put  
9 -- if you restricted public access and said that pipeline  
10 employees couldn't hunt on the pipeline property, that  
11 would solve the problem right there.

12 Q All right, so you prefer  
13 to that approach than having a zone on either side of  
14 say two to five miles, in which you couldn't hunt.

15 A Sure, I think it would be  
16 much easier. I think it would be very undesirable  
17 to have public access to the right-of-way.

18 Q O.K., on page 2 of your  
19 prepared testimony about half-way down, you made the  
20 statement:

21 "The establishment of the cause and effect  
22 relationship between a project and a population  
23 decline,"  
24 sorry, have you got that?

25 A I'm finding it, yes.

26 Q  
27 "...is a most difficult task, requiring  
28 detailed understanding of the caribou's  
29 biology and intense study over a period  
30 of years."



Calef, Lent, Bergerud  
Cross-Exam by Hollingworth

1 Now, have you given consideration to exactly how long  
2 the research would be that would be required that you  
3 are anticipating there?

4 A I think that it would  
5 certainly occur throughout the construction period and  
6 probably for at least five to ten years afterwards,  
7 although again I would hope that as the necessity for  
8 management of the herd increased that more and more  
9 of the monitoring would just become part of a manage-  
10 ment scheme for the herd which wouldn't be restricted  
11 just to the impact of the pipeline.

12 Q And on page 3 at the  
13 bottom, in your discussions of the Bluenose herd there  
14 are two population estimates. Have you any material  
15 which indicates which would be the more accurate  
16 estimate at this time?

17 A I have no published  
18 material. I feel quite confident from personal  
19 communications that the 90 to 100,000 figure is correct.

20 Q Even at the time of 1967?

21 A Oh, sorry, no; but I  
22 suspect that the 19,000 estimate was low.

23 Q And you feel the  
24 present population would be in the 90-100,000 range.

25 A That's right.

26 Q And on page 6 at the  
27 bottom you're speaking of the 40-mile herd. You say:

28 "It apparently began not only to decrease in  
29 size but also to shift its ranges away from the  
30 south-eastern parts of the range."





Calef, Lent, Bergerud  
Cross-Exam by Hollingworth

1 Have you any documentation on that?

2 A Yes, my summary here is  
3 just a very, very condensed version of a big section  
4 that's found in Ron Skoog's Ph.D. thesis from the  
5 University of Alaska entitled:

6 "The Caribou of Alaska."

7 Sorry, did I say that he was from the University of  
8 Alaska? He did the work in Alaska. The thesis was  
9 actually from the University of California, but it's  
10 entitled:

11 "The Biology of Caribou in Alaska."

12 He goes into great detail of the history of all the  
13 caribou of Alaska, or at least of the populations of  
14 all of what he calls the caribou regions of Alaska,  
15 so you can get -- it's just fascinating reading and  
16 I think it's worth looking into.

17 Q O.K., and on page 7 to-  
18 wards the bottom, talking about the fact that it  
19 took caribou a long time to start crossing the Steese  
20 Highway again after it was put in, or crossing that  
21 area after the highway was put in, --

22 A No, I think what I was  
23 implying was that they did cross the highway for a  
24 period of approximately 40 years. I would think it  
25 took them a long time to stop crossing the highway  
26 after it was put in.

27 Q I see. Do you see any  
28 correlation between this and the pipeline right-of-  
29 way?

30 A Well -- yes



Calef, Lent, Bergerud  
Cross-Exam by Hollingworth

Q Assuming a pipeline is  
in place.

A -- no, I don't, for the  
reason that I don't think it was just the physical  
barrier of the highway itself which stopped those  
animals. I think it was all the related disturbances  
-- hunting and trapping, and human activity which I  
would not anticipate would be anywhere near as high  
on a gas pipeline, at least unless looping and  
emergency repairs were going on continuously and you  
had trucks and bulldozers and things coming and going,  
then what you would have is a highway, not a pipeline.

Q And of course, if the  
access was restricted in the way we suggest, then  
there would be even less cause to compare the two.

A That's right.

Q On page -- I have numbered  
it page 1 of your testimony, prepared testimony toward  
the bottom of the page you state:

"For example, with regard to the Arctic  
north-western Alaskan population, evidence  
exists demonstrating use of the same calving  
grounds for over a century during which time  
the population has undergone changes in  
numbers from highs of over 200,000 to lows  
of perhaps a tenth of that."

Now are these variations due to natural phenomenon,  
or to man-made ones, or to both? I just asked the  
question of the year?

WITNESS LENT:  
A Again I think the



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information is insufficient to establish clear cause and effect relationships. We have examples where either type of phenomenon can be closely associated with declines. In this case, the evidence is really not clear.

Q Well then over on page 2 toward the bottom, you talk about hunting possibly leading to the total disappearance of the herd on the Seward Peninsula in the Lower Yukon in the 19th century. What evidence have you for that assumption or possible assumption?

A The evidence is pretty fragmentary, but some of the early explorers noted extremely high harvest of calves in particular. I think there's a reference to Doyle visiting one village in which he saw 4,000 skins approximately, if I recall the figure correctly. Anyway, we have pretty fragmentary but some historical evidence that a very high level of harvest at that time, and we know that there was a very high degree of trading going on and that such skins had great value in trade, particularly in areas where explorers, whalers later, and two areas where natives did not have access to calf skins.

Q That's the extent of the evidence, is it?





1 A Yes.

2 Q And on page 7 you  
3 speak of the necessity to sum the natural variabilities  
4 plus manmade factors and I wasn't quite sure of the  
5 implication of that. What I understand you to be saying,  
6 that in your opinion caribou would not adapt to the  
7 manmade changes?

8 A Now, we have to distin-  
9 guish between whether you are talking about adaptation  
10 in evolutionary terms or in shorter term processes.

11 Q Well, let's go the  
12 shorter term.

13 A I think we have talked  
14 enough about this to have established that a certain  
15 degree of adaptation, if you like, behavioural modifica-  
16 tion will occur. I think it is obvious from all the  
17 testimonies, that we don't know to what extent this  
18 will occur.

19 Q What is your feeling on  
20 a no hunting zone on the side of the pipeline corridor?

21 A This is what has been  
22 done in Alaska, a five mile zone on either side of the  
23 corridor. My discussions of this with biologists involved,  
24 they seemed to be of the opinion that this was a good  
25 move, that it has been helpful in dealing with management  
26 problems. In certain areas, of course, this does not  
27 apply, that is, in areas where there was existing  
28 access and it of course depends upon, in Alaska, the  
29 corridor goes through land which is in various forms  
30 of legal status. So the corridor is not throughout



Alaska. In some areas, and I believe that I mentioned this in my previous testimony, in some areas where carnivores, bears, wolves, and other -- foxes, have been attracted to camps where they have been -- people have been able to legally hunt them and not people associated with the construction itself, but local residents, and these of course have become easy prey then to local residents. I think the closure not only has biological benefits, it certainly has political benefits in terms of the general public being reluctant to accept that pipeline construction workers and related personnel would have access to game and fish populations which they did not.

Q Have you studied woodland caribou, or are your studies restricted to barren ground?

A No, I have not studied woodland caribou.

Q Dr. Bergerud, I am just interested in one point on page 5 of your prepared testimony. You seem to feel that possibly the definitions of woodland caribou and barren ground caribou aren't valid and that really they're just differences of behavioural patterns, even within so-called woodland caribou and in so-called barren ground caribou. Do I interpret your evidence correctly?

WITNESS BERGERUD: Yes, sir.

Q What are these differences that you are speaking of? You say that they are physiological, morphological and behavioural adaptations,



Can you run through some of those?

A Can you tell me which  
caribou population you want me to talk about?

Q Well, let's talk about a  
so-called woodland caribou herd in around Yellowknife.

A Around Yellowknife ?

Q Well, there are some about  
50 miles out --as opposed to the Porcupine herd.

A Well, I believe that one  
can begin to understand the adaptation, the behavioural  
adaptations by understanding <sup>the</sup> environment, so I would  
ask you to describe the environment that these animals  
are living in.

If these animals are  
living in a heavily wooded area and have predators there  
with them, then they are coming up with considerable  
different behaviours that are open dwelling  
caribou looking at another kind of predator. Like, if  
these are animals that are looking through dense woods  
at lakes, it is different than barren ground caribou  
looking across the open tundra at wolves. We could say  
that animals who live in the deep woods have to react  
much faster to predators, so that in the terms of  
man, these animals would probably be more wary,  
their flushing distance will be great. They will be  
relying on sound. They will be much more -- their  
hearing will be much more a part of their picture than  
will their eyes. They will be wary, they will have  
flushing distances relative to the density of their  
cover. They will be more apt to go under trees. They





1 would be more apt to go under a pipeline. Initiative is  
2 stronger. Each animal for himself in these small  
3 herd sizes, they will be less gregarious. They may have  
4 no calving ground. They may have a strategy of  
5 being dispersed at calving time, each animal having  
6 its calf in a different part of the forest, and that  
7 this is the best strategy to beat the predators,  
8 because if you don't have openness and can't get  
9 together, there is no advantage in being together, if  
10 the animals can't communicate in dense woods, then  
11 they lose their advantage of being clumped. I can  
12 go on a long time.

13 Q Yes, I was just going  
14 to ask you if I could stop you for a minute and ask  
15 you about this lack of gregariousness, because it  
16 seems to me that the woodland caribou as we know them  
17 are in much smaller groups than the barren ground  
18 caribou, and to what do you attribute that?

19 A Yes, I am studying a herd  
20 right now in which the mean aggregation size is 1.1,  
21 which is the same -- which is less than moose.  
22 It is everyman for himself. In fact, they hardly  
23 find each other in the rut.

24 I have lost track of your  
25 question. Why do I contribute to small--

26 Q Yes, why are the woodland  
27 caribou less gregarious than the barren ground?

28 A Well, because of this  
29 forest habitat, because their food is finely mixed, it  
30 is not a continuous carpet. We can't all get together



and feed on these little patches of food that are scattered through the woods. Our communication is less. There is less value in being together when we come against predators. I believe that animals are gregarious to a considerable extent because it is advantageous in predator interactions, but it is only advantageous if you are in an open habitat and you can communicate with each other. A dispersed strategy is a way to beat predators in forest cover. Predators have got to walk around looking, and there is no communication between animals. The best strategy is to be scattered and to be in small numbers. Well, I think that it is largely food supply and predators that separate us.

Q And is it mainly the same reasons that result in shorter ranges of travel?

A Yes. I think -- you know, my thesis is that wolves are very important in the evolution of caribou in that these migrations evolve so that caribou can get away from wolves and calve in the open, but these animals are staying where they are. They have adapted to a sedentary life and there is no way to beat the wolves, there is no where to go within this environment, so they live there year-round.

Q Now, you stated that you felt a woodland caribou would be more likely to go under a pipeline than a barren ground one. What is your feeling generally about their reception, if you like, to a pipeline right-of-way, as between woodland caribou and the barren ground caribou?



1                                   A     I really dislike using  
2 these words "woodland" and -- why don't we call them  
3 the Yellowknife population. Each population -- I always  
4 say           in my Newfoundland population I have never  
5 published papers.

6                                   Q     Well, let's say ones  
7 that stick to the woods and ones that stick to the plains,  
8 if that makes you feel better.

9                                   A     Would you rephrase your  
10 question again, please?

11                                  Q     Well, you spoke of the  
12 caribou who live in the forests as being more likely  
13 to go underneath a pipeline assuming that you had a  
14 raised pipeline. Generally speaking, do you feel that  
15 they would be more receptive to a pipeline right-of-  
16 way than a barren ground caribou is likely to be, or  
17 caribou which resides on the North Slope?





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1                                   A       They are looking at  
2  
3 things in their environment that resemble forest, so  
4  
5 an open area is not particularly advantageous. They  
6  
7 are going under trees all the time, and a pipeline  
8  
9 might look like a tree. All animals like edges, so  
10  
11 this corridor will perhaps provide an edge. Food is  
12  
13 much scarcer in the forest so that they might congre-  
14  
15 gate on your cleared area feeding. I would think that  
16  
17 they might use your edge if there is a rich assortment  
18  
19 of plants develop there because of sunlight, they might  
20  
21 be out there feeding. One of the things that I like  
22  
23 to study in caribou, and this is harassment, I guess,  
24  
25 is to buzz a caribou herd and try and decide whether  
26  
27 their escape reaction is to run into the woods or to  
28  
29 run out of the woods. In Newfoundland where I studied  
30  
31 Newfoundland caribou, I would buzz a herd of  
32  
33 caribou and if they were in the woods they would run  
34  
35 out, and they would roar by the moose that was running  
36  
37 in.

38                                   (LAUGHTER)

39 Now I'm studying a bunch of caribou in Ontario where  
40  
41 it's very dicey as to whether they are living in the  
42  
43 open or the woods. The pattern here is so confusing and  
44  
45 I'm really having difficulty deciding whether escape  
46  
47 cover is to get into the woods, or escape cover is to  
48  
49 find everybody else and get out in the open. A lot of  
50  
51 caribou run for each other, you know, gather around in  
52  
53 the middle of lakes, run for the open. I mean if wolves  
54  
55 are a big part of the environment, wolves are really  
56  
57 ambushing you in lichen woodland, scattered forest,



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1 caribou will probably run for the open if you buzz them.  
2 This is a reaction that has come from a predator  
3 relationship. When we see man -- the caribou inter-  
4 actions, these behaviours have developed from caribou  
5 predator adaptations, and so we can get some insight  
6 of how they react to us as to the important components  
7 in their evolution.

8 Q Well, let me put it this  
9 way then. In discussing the impacts of the pipeline,  
10 do you feel it would be greater or less, or the same,  
11 on forest-dwelling caribou as opposed to plains-  
12 dwelling caribou, or do you say there are too many  
13 variables to give an easy answer?

14 A I think that I can make  
15 some guesses on what caribou will do, if you'll describe  
16 to me what you've done. This is a cleared --

17 Q 120-foot wide right-of-  
18 way through fairly dense forest. Buried pipeline.

19 A Well, I don't know what  
20 they will do. I guess that this will increase the  
21 openness of their habitat and if they are really are  
22 as secretive as some of the animals that I am studying  
23 now, they may avoid this line and not go out in that  
24 openness. My experience is that even the densest  
25 dwelling animals come out on the edge and feed and  
26 are ready to run back in the woods if a disturbance comes  
27 along. I would think they could adapt quite well  
28 to a pipeline.

29 MR. HOLLINGWORTH: Thank you  
30 very much, gentlemen.



Calef, Lent, Bergerud  
Cross-Exam by Carter

1 CROSS-EXAMINATION BY MR. CARTER:

2 Q Dr. Lent, if I could  
3 start with you, I refer you to your prepared evidence  
4 at page 6 toward the bottom of that page, sir, you  
5 state:

6 "In a migratory species, such as a caribou,  
7 optimum use of the Arctic environment naturally  
8 depends upon being in the right place at the  
9 right time."

10 And you've referred today to your view that one of the  
11 reasons at least the caribou go to the North Slope is  
12 because of the vegetation there. Is that correct?

13 WITNESS LENT: That's correct.

14 Q Bearing this in mind,  
15 I'd like you then to look at a passage in Dr. Calef's  
16 evidence and comment on it, please. That's at page  
17 25 of Dr. Calef's evidence. Dr. Lent, again towards  
18 the bottom of the page, and perhaps I'll read it:

19 "They,"

20 and here he's referring to Renewable Resources,

21 "They say migration,"

22 and he quotes,

23 "enable the caribou to utilize range most  
24 effectively without over-utilization."

25 I would be very surprised, sir, if the applicant's  
26 consultants could with the data available to them do  
27 an analysis of migration and prove that the patterns  
28 used are the most effective utilization of range. We  
29 know remarkably little about the productivity of caribou  
30 ranges, their carrying capacities, their nutrient content





Calef, Lent, Bergerud  
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1 of plants in various areas and so forth. I'd like you  
4 to comment on that, and then on the next statement:

3 "Again we speak of the most favorable energy  
4 balance. I have seen no proof whatsoever to  
5 indicate that energy is a major factor involved  
6 in migrations."

7 Would you comment on that, sir?

8 A Well, I mentioned before  
9 some evidence which has arisen in recent years dealing  
10 with differences in the nutrient content of various  
11 forages throughout the range of migratory caribou and  
12 reindeer. Where Dr. Calef has said, "Could we prove it?"  
13 I think probably no, not in terms of a formal proof,  
14 but there is a lot of evidence being accumulated to  
15 indicate that there is at least the timing of movements  
16 is taking advantage of nutrient levels in forage which  
17 are available at certain times in certain places. I  
18 mentioned specifically the greening up of eriophorum  
19 that's cotton grass in calving areas in Northern Alaska,  
20 and similarly in Northern Eurasia I mentioned Soviet  
21 work indicating high protein levels in summer browse,  
22 bearing in mind that lichens which form a major compon-  
23 ent of winter forage for most caribou and reindeer are  
24 extremely low in protein or nitrogen content. In short  
25 there is a good deal of evidence being accumulated at  
26 present and in the recent past dealing on this subject.

27 Q In your evidence, and  
28 I believe this was at page 15, you referred to the  
29 Nelchina herd. Would you agree, Dr. Lent, that  
30 hunting was the major cause for the reduction in the



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Cross-Exam by Carter

1 population of the Nelchina herd?

2 A No, I would not.

3 Q What in your view has  
4 caused the reduction in that herd?

5 A The view of the biologists  
6 that have been studying that herd has not reached a  
7 firm conclusion except that they have pretty firmly  
8 concluded that hunting was not the cause of the initial  
9 decline. This is what I was getting at earlier this  
10 afternoon when I was talking about the importance of  
11 monitoring populations. If the initial decline was  
12 caused by an egress, as some biologists feel was the  
13 case with the Nelchina herd, if hunting continued, if  
14 harvest continued at the same level then this would of  
15 course lead to a decline. But the initial decline, so  
16 far as we can determine with the Nelchina herd, was  
17 not due to hunting. I could quote some material which  
18 I think I have with me, if you like; but that, I think,  
19 summarizes it.

20 Q Would that material  
21 include<sup>a</sup> paper by Greg Boss, I believe his name is?

22 A That's correct.

23 Q And as I understand, that  
24 paper included hunting as one of the reasons, also  
25 wolf predation and of course the movement to other  
26 ranges as reasons for decline in the Nelchina herd.



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1 A Yes, that is correct.

2 The movement in this case was not as well documented as  
3 in the case of the Steese 40-Mile herd, that is the  
4 egress.

5 Q Yes, Dr. Calef,  
6 it appeared from the book, if I can call it that, that  
7 this paper appeared in, that it was presented at a  
8 conference, or symposium on caribou, in Alaska, and  
9 I took it from there that you were at that conference  
10 as well?

11 WITNESS CALEF: Yes, I was.

12 Q And you recall the  
13 paper presented by Mr. Boss?

14 A Yes, I do.

15 Q Now, in your evidence  
16 you stated that the decline in the Nelchina herd and  
17 this, for your reference, is page 4 of your evidence.

18 A Yes.

19 Q At the bottom of the  
20 page you say the build up was documented by Skoog, but  
21 the decline was inexplicable.

22 A Yes.

23 Q Do you still hold that  
24 view that it is inexplicable?

25 A Well, perhaps inexplicable  
26 isn't quite the word. What I meant was inexplicable in  
27 very precise, demographic terms. In other words, we  
28 do not have any evidence about where the supposed emi-  
29 gration from that herd went. In other words, we did  
30 not see 40,000 animals turning up in the McKinley herd





or in the Porcupine herd or in the Arctic herd or whatever. We did not have good data on births and deaths of animals throughout that period and we did not have periodic censuses, say, one to two year intervals throughout that so that we could document the year by year changes in the herd, any of the reproduction or mortality.

Q But you don't disagree with the conclusions reached by the paper presented by Greg Boss.

A Well, no, I don't, they are very general. I think he said essentially it declined and emigration was a possibility. Overhunting might have contributed. There was some evidence of a decrease in reproductive success, and/or survival of the calves, etc., and, you know, one would assume that some of these things were taking place if the herd declined, but in terms of really being definite about what went on, I think the word is "inexplicable."

Q Now, Dr. Lent, in your testimony, you dealt at considerable length with studies you have done in Alaska in respect to an above-ground pipeline, or at least simulated above-ground pipeline and showed us a film. You would agree, would you not, that there is a difference between that and the proposal being put forth by Arctic Gas for a buried gas pipeline?

WITNESS LENT: Of course.

Q Are you familiar with the Arctic Gas proposal?



1 A That depends upon how  
2 familiar you mean.

3 Q Well --

4 A I have read through  
5 quite a bit of the available material, particularly  
6 relating to the Alaskan side of the proposal.

7 Q And you are familiar  
8 with the route alignment?

9 A Yes, again, particularly  
10 on the Alaskan side.

11 Q I take it you wouldn't  
12 have the same concern that gave rise to your tests about  
13 crossing the pipeline -- you don't have the same concern  
14 with a buried pipeline as you do with the above-ground  
15 pipeline?

16 A You are asking specifically  
17 about crossings?

18 Q Yes.

19 A That is right. I wouldn't  
20 have the same degree of concern.

21 Q And the idea of creating  
22 a barrier, you devoted some time, as I recall in your  
23 testimony to this problem? A creation of a barrier, so  
24 that you wouldn't have that problem, or at least not  
25 nearly to the same extent with a buried pipeline?

26 A That is correct.

27 THE COMMISSIONER: I thought  
28 that -- you showed us those movies of a test you did  
29 in Alaska and they related to crossings established to  
30 enable caribou to get past the elevated oil pipeline. That



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is what all of that was about.

A Yes, except that I might just add that we were also looking at roads, responses to roads which are elevated berms, essentially.

Q And the only consideration, leaving aside the responsibility of this Inquiry to examine an oil pipeline as well as a gas pipeline, but the only problem we are facing here with this gas pipeline in terms of the response of caribou to the right-of-way, is the likelihood that they might use it to move along the cleared path and be deflected from the traditional migratory route. That is the point that I thought was being made earlier in that connection. Now, Mr. Carter, as I understand it, no one is suggesting that the problem of crossing an elevated oil pipeline is identical to that of crossing the right-of-way, that may have a berm where the pipeline is located, that doesn't have any barrier in the same sense as an elevated oil pipeline represents a barrier.

In commenting just now, have I misrepresented the situation, particularly with respect to the problem, if it is a problem of caribou moving along the cleared path for purposes of foraging or whatever and being deflected thereby from their traditional migratory route?

A No, you certainly have expressed it quite well, and of course I mentioned before that this problem, one of the times when this problem occurs is during the insect season when they are





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using this relief provided by a berm.

MR. CARTER:

Q Sir, that was precisely why I was pursuing this, because I recalled Dr. Lent saying that he thought that the mound, as I take it, over the pipe would provide relief from insects, and it seemed to me that I should now ask him what<sup>is</sup> his understanding of the proposal.

THE COMMISSIONER: All right, fine, fine.

MR. CARTER: Dr. Lent, what size of a mound would it take to attract caribou for the purpose of getting away from insects?

A Well, that obviously depends upon a lot of variables. The topography relief, the wind direction, and a number of things. We were looking at the berms associated -- well, two types, those associated with elevated roads and those associated with the gravel ramps over the pipe and so we were looking at one berm which would be approximately four to five feet high. That would be road, about four feet.

Q But if you had neither a road nor a large gravel berm created to permit crossing over an above ground pipeline, you wouldn't see that as a problem, would you? I am suggesting to you, sir, that the Arctic Gas proposal doesn't have any berms to go over an above ground pipe, nor does it have roads along the right-of-way, so that you were talking about a different situation and it was for that situation that I asked you for your understanding of



the Arctic Gas proposal.

3 A Then it has no berm  
4 whatsoever?

5 Q Well, the berm that  
6 results from putting the backfill back over the  
7 pipeline. If that were the case --

8 THE COMMISSIONER: Well, to  
9 be fair Arctic Gas has told us that they intend  
10 in certain instances to surcharge the berm to avoid  
11 frost heave.

12 MR. CARTER : But, sir, that  
13 is not the case in the North Slope, you don't have  
14 a problem of frost heave in the continuous permafrost.  
15 I think that it is a legitimate area to pursue.

16 THE COMMISSIONER: Well that  
17 is something that Dr. Clark, it seems to me, didn't  
18 conceive, but maybe you are right. Let's not get into  
19 frost heave, anyway. You carry on.

20 No, he said, I think you are  
21 quite right, he said that if Dr. William's thesis was  
22 sound, we would have unmanageable frost heave even in  
23 the zone of continuous permafrost. That would be  
24 the North Slope, but accepting the Arctic Gas thesis,  
25 regarding the required shut off pressures, you wouldn't  
26 have the problem in the zone of continuous permafrost  
27 so I suppose you are right.  
28  
29  
30



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1 MR. CARTER: There's no proposal,  
2 sir, for a berm on the North Slope.

3 THE COMMISSIONER: Well, all  
4 right. I guess you're right, no proposal for surcharging  
5 the berm to avoid frost-heave.

6 MR. CARTER: Right.

7 THE COMMISSIONER: You've got  
8 a berm or you've got a mound.

9 MR. CARTER: Right.

10 Q Would you foresee the  
11 caribou being attracted to the mound, and without  
12 giving evidence, it's you know, around two feet of the  
13 dirt that's piled up over the pipeline after the ditch  
14 is dug and the pipe's put in.

15 A I don't have  
16 enough information to tell you what behavioural differ-  
17 ences between a 2-foot mound and a 4-foot berm.

18 Q Well, wouldn't your  
19 experience help you to tell us whether or not you  
20 would expect the caribou to be attracted to a 2-foot  
21 mound to escape mosquitos?

22 A If the variation and  
23 relief over the surrounding area was approaching  
24 zero, then they probably would be.

25 Q All right. Dr. Lent,  
26 are you sufficiently familiar with the alignment as  
27 it is proposed along the North Slope to tell us  
28 whether or not in your view -- well, to tell us how that  
29 would inter-react with the calving grounds? Where are  
30 the calving grounds of the Porcupine caribou herd in





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1 the North Slope in relation to the pipeline alignment.

2 A Well, I think you're  
3 talking now in terms of -- you're asking me to talk  
4 about terms of distance from the coast particularly, or  
5 about east-west area?

6 Q Well, sir, the Commissioner  
7 raised this point a day or two ago, I believe, with  
8 Dr. Cowan, and he had said in earlier testimony that  
9 Dr. Banfield for one stated that the calving, or at  
10 least the bulk of the calving took place in the  
11 foothills, and that therefore at least the bulk of  
12 the calving was south of the pipeline alignment and  
13 I'm wondering what your opinion is with respect to that.

14 A Yes, well apparently in  
15 some years that has been the case, that is that the  
16 bulk of it has occurred south of the alignment, and in  
17 other years that certainly hasn't been the case, and I  
18 believe in my supplementary testimony, not in my original  
19 prepared testimony, but when I gave evidence in chief  
20 I refer to observations of Skoog in the early '60's  
21 where as best I could determine from looking at his  
22 data and looking at the route alignment, the bulk of  
23 calving did occur north of the alignment.

24 Q Is the tendency, though,  
25 for the caribou to calve in the drier areas?

26 A Yes, that's the general  
27 tendency in both the Arctic and the Porcupine herd.

28 Q And you've stated in your  
29 testimony at page 2 that in Alaska, Arctic calving  
30 grounds are located in foothills and drier coastal tundra



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1 dominated by the technical word, cottongrass tussock  
2 vegetation. Is that correct?

3 A Yes, that's correct, and  
4 of course the situation is very different with the Arctic  
5 herd. With the Porcupine herd we have the changes  
6 compressed into a relatively short distance, whereas  
7 the Arctic herd is calving in an area where the mountains  
8 are much farther away from the coast, the coastal plain,  
9 a very wet coastal plain is much broader in expanse.  
10 Now I think that while I made the generalization that  
11 they are using drier areas, the important point is that  
12 the calving area shifts somewhat from year to year  
13 depending, I believe, on the snow cover and the rate  
14 of snow melt, and certainly the Renewable Resources work  
15 has established that the timing and the location of  
16 calving varies from year to year and they've suggested  
17 some relationships with spring weather conditions and  
18 winter snow cover conditions.

19 THE COMMISSIONER: That's it,  
20 is it? Well, carry on, carry on, I'm just kidding.

21 MR. CARTER: Q Dr. Lent, in  
22 your testimony you referred to the Prudhoe Bay herd,  
23 and I believe there's approximately a population of  
24 3,000 animals.

25 A Yes, two to 3,000.

26 Q And these were the animals  
27 -- it was animals from this population that we saw on  
28 the film.

29 A We don't know that for  
30 sure.



Calef, Lent, Bergerud  
Cross-Exam by Carter

1 Q I took it that it was  
2 filmed in Prudhoe Bay.

3 A That's correct. However,  
4 it's known that caribou certainly from the Arctic herd  
5 have in the past reached that far east. This identifi-  
6 cation of the Prudhoe Bay herd has apparently been at  
7 least at the moment a distinct sub-population as a  
8 fairly recent event. I'm not saying that the sub-  
9 population itself is recent, but the identification  
10 of it is fairly recent, and it was made at about the  
11 time that we were doing these studies. So I'm sure  
12 it's likely that that so-called Prudhoe Bay population  
13 was involved, but we can't say that for sure.

14 Q I see. What's the  
15 status of that population at the present time?

16 A Well, roughly the same.  
17 I don't think there has been a detailed census of  
18 numbers taken, as far as I know.

19 Q So there's been no  
20 detection, of any decline owing to the development?

21 A No, not to date. May  
22 I continue? The calving occurs east of the Prudhoe  
23 Bay oil field, and the animals are moving, as I've  
24 said in previous testimony, roughly parallel to the  
25 existing corridor.

26 Q And you would agree and  
27 I believe the film showed that there was considerable  
28 development, is considerable development in that area.

29 A Oh yes.

30 Q Dr. Lent, are you familiar





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1 with the recommendations that Renewable Resources have  
2 made to Arctic Gas for the construction of the pipeline?

3 A I've read through them  
4 in the past.

5 Q And these relate to the  
6 timing of construction and with respect to the North  
7 Slope, for example, they've recommended that construction  
8 cease at least one month prior to calving, and that there  
9 be no disturbance, including aircraft overflights during  
10 calving or the post-calving aggregation. Would you  
11 support such a recommendation?

12 A I have to make the assump-  
13 tion that the corridor will be used.

14 Q Yes.  
15 MR. ANTHONY:

16 That's the point I was  
17 going to make. I thought that when I was cross-examin -  
18 ing the panel initially I asked all panelists whether  
19 they had made a series of recommendations that were  
20 in any form to Arctic Gas that we could perceive, and  
21 they following that Dr. Gunn provided us with his  
22 list of recommendations, and Dr. Jakimchuk and others  
23 indicated they had not done so, and I'm just wondering  
24 where they are and what specifically my friend is  
referring to.

25 MR. CARTER: Well, sir, Mr.  
26 Jakimchuk advised me that this is in his testimony.  
27 It's also in the Biological Report series throughout.

28 THE COMMISSIONER: Well, it's  
29 a question of what the word "recommendation" means in  
30 this context. Maybe you could tell us what you mean,



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1 Mr. Carter.

2  
3 MR. BAYLY: Mr. Commissioner,  
4 I understand that we have an undertaking from Mr.  
5 Jakimchuk and others to provide us with a list of  
6 these recommendations. I for one have not seen these  
7 yet, and unless as you say we're dealing with something  
8 quite different from what I understand to be a recommen-  
9 dation for the applicant, perhaps Mr. Carter could  
10 clarify this point.

11 THE COMMISSIONER: Yes.

12 MR. CARTER: Well, sir, I  
13 thought they were in the testimony. Mr. Jakimchuk said  
14 they're in his, and Mr. Hemstock testified that he had  
15 received these recommendations and agreed with them.  
16 They may not be in point form that Dr. Gunn gave his  
17 recommendations. He, I understood, tied his altogether.  
18 But they have certainly been made and I thought my  
19 friends were aware of that.  
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Calef, Lent, Bergerud  
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MR. ANTHONY: Mr. Commissioner,  
if Mr. Carter is going to be cross-examining on the  
basis of recommendations which are not brought together,  
but widely dispersed, I would suggest that one,  
if it is in the evidence, perhaps he could identify it,  
if it is scattered throughout the Biological  
Report Series and he wishes to cross-examine on it, I  
wish he would identify where the recommendation is  
found in order that the witness can be more familiar  
with the recommendation.

THE COMMISSIONER: Well,  
all right, do you want -- you were conferring with  
Mr. Marshall, did you want a moment to sort this  
out?

MR. MARSHALL: Well, I  
suppose I was involved at the time that this  
exchange took place. Frankly, I think that we are  
being asked to do the work of other counsel. These  
recommendations are in evidence, they are in the  
Biological Report Series. Now, as a matter of  
convenience, Dr. Gunn had put his all together in a  
separate report.

THE COMMISSIONER: Dr. McCart  
said that he would do that. I don't remember Mr.  
Jakimchuk agreeing to it but--

MR. MARSHALL: He said he  
would do so as well and he had already started on  
that, but it is a matter of pulling together recommen-  
dations that are contained in that great volume of  
yellow bound reports. Now, they are all in evidence, they





are all on the record, now counsel are saying, "Put it all together for us so that we have got a handy little list that we can use for cross-examination." Now, we said that we are going to provide this. I don't think that we would have had any obligation to do that sort of thing. It is a kind of extraordinary step to take, if you like, but we're prepared to do it, we are going to do it if the witnesses ever get off the stand and don't have to be here for cross-examination. We'll get the reports out and so on, and I think, really, that is as far as we can take it, sir.

MR. RYDER: Surely, Mr. Commissioner, we don't need to sort out the status of the organization of these recommendations now, and interrupt the questioning of these witnesses. Surely, Mr. Carter can put his proposition to him in whatever form --

THE COMMISSIONER: I think if we can resolve this, /Mr. Carter will simply be specific about the recommendations that he wants the witnesses to comment on, and this business of whether these things have been pulled together in a way that it was agreed would be done can be deferred. We know that it is going to be done and that 's that. Is that all right, Mr. Carter?

MR. CARTER: Fine, sir.

MR. ANTHONY: Mr. Commissioner, perhaps the point of the undertaking could be settled, do I still understand that it is the intention of Arctic Gas, as indicated in the transcript at page



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14536 to provide this list of recommendations of  
Mr. Jakimchuk? It is just that they are not doing it now.

MR. MARSHALL: That is just  
what I got through saying.

MR. ANTHONY: Now, the other  
thing that I find difficult though, Mr. Commissioner,  
if Mr. Carter is going to refer to them, I assume  
he's therefore drawn them out of the mass of material,  
as he refers to it, and I would just ask that they  
be identified, if possible identify where they are  
located, because I think that it is very difficult to  
ask the witnesses comments. If he defines the recommenda-  
tion in some detail and assists us initially, but I  
would certainly like the opportunity of knowing where  
their recommendation we obtained in order  
for further comment to be made on them.

THE COMMISSIONER: Well, let's  
allow Mr. Carter to proceed and we will just watch how  
he does this and then pass judgment on it.

MR. CARTER: Dr. Lent, I  
will give you the recommendation again and ask you  
whether or not you would support such a recommendation.  
This is dealing with the North Slope. The pipeline  
construction be completed at least one month prior to  
the calving period and that there be no disturbance of  
any kind including aircraft overflight permitted during  
the calving period and during the post-calving aggre-  
gation.

Now, assuming that the pipeline  
is constructed along the North Slope, would you support



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such a recommendation?

WITNESS LENT: Yes.

THE COMMISSIONER: So far so  
good.

MR. ANTHONY: The answer is  
easy, it is the question that bothers me.

THE COMMISSIONER: There is  
fifteen minutes to go. Let's hang together here.

MR. CARTER: I presume, Dr.  
Lent, that you support it because in your view, if  
that were implemented, it would have a mitigative  
effect on the possible impact of the pipeline?

A Yes, mitigative is a  
good word. Of course, if you want to talk about whether  
it is a realistic recommendation in terms of its  
coming into reality, that is a different subject.

Q Are you alluding to  
these slippages that you have talked about in your  
testimony?

A Yes.

Q All right. You would  
further recommend that whatever can be done on this  
project to prevent such slippages should be done?

A Yes, except that one  
has to look at the environmental ramifications of any  
action, that is, something else I owed it to was that  
efforts to prevent slippage for one reason sometimes  
result in environmental--

THE COMMISSIONER: You are  
talking about slippages in the construction schedule?





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A Schedules, yes.

THE COMMISSIONER: So your argument is, and you made this last month, that the condition or the recommendation that Mr. Jakimchuk has made is sound in theory but that you are skeptical as to whether it would be found possible to adhere to it in practice. Is that your point?

A Yes, that is essentially it, yes, that pressures develop.

THE COMMISSIONER: Yes, and you explained that last month.

A Yes.

MR. CARTER: Dr. Lent, you, this is page 7 of your testimony, you referred to the evidence that Mr. Jakimchuk had given and if I can quote from your testimony, you say:

"The implication has been made in Arctic Gas reports and testimony that because caribou accommodate to variations and natural conditions, they will have no difficulty accommodating to manmade changes in the environment. This concept is extremely misleading. "

Now, Dr. Bergerud today stated that in his view caribou /the caribou are adaptive and some changes, at least, are able to adapt to. Do you disagree with that?

A I think that we are over-using the word "adaptive." I agree with it up to a point, but Dr. Bergerud also said that many caribou populations and possibly the Porcupine caribou population



1 is in a delicate state of balance with its natural  
2 environment. Now, perhaps he didn't use the word  
3 "delicate", I may be adding that -- that would lead  
4 me to the conclusion that additional adverse effects  
5 from manmade phenomena could shift the balance in  
6 the wrong direction.

7 Q Did not your film  
8 show us that caribou can adapt to some pretty extreme  
9 manmade changes?

10 A No, I didn't think that  
11 it was showing that. It shows that some caribou  
12 use crossings. It shows that some caribou like to  
13 go up on raised roads and walk along them and occasionally  
14 get hit by vehicles. It shows that a lot of caribou  
15 don't use the crossing facilities. I don't think it  
16 shows what you are suggesting at all.

17 Q It would be wrong, I take  
18 it, in your view, for Mr. Jakimchuk to say that because  
19 caribou have adapted to natural changes in the environ-  
20 ment and some manmade changes, that they could adapt  
21 to any manmade change. That would be misleading, would  
22 it not?

23 A Yes.

24 Q But it is also misleading  
25 to state that caribou are unable to adapt to any  
26 manmade change?

27 A Yes, Dr. Bergerud has  
28 discussed the fact that certain manmade -- they are  
29 essentially pre-adpted for certain types of man-induced  
30 factors.



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1 Q And you are in agreement  
2 with him on that?

3 A Yes, again, however, we  
4 have to look at the cumulative, the additive effect  
5 of degrees of change in the environment.

6 Q Now, in your testimony,  
7 Dr. Lent, you expressed a preference for the  
8 Fiarbanks corridor?  
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1 A Yes.

2 Q But at least in your  
3 prepared evidence you didn't express a preference for  
4 the coastal over the interior, or vice versa; but I  
5 take it from what you've stated that you prefer the  
6 interior route.

7 A That's correct, I've  
8 stated that twice at least.

9 Q Now, could I ask you to  
10 make certain assumptions and then following those  
11 assumptions, again express your view as to which  
12 route is preferable. The first, I think the first  
13 and foremost, is that there is legislation in exist-  
14 ence to enforce the recommendations that have been made  
15 by the biologists, and to prevent slippages such as  
16 have occurred in Alaska. Can I ask you to assume that?

17 A You can ask me.

18 Q All right, and another  
19 assumption that was put to the biologists for Arctic  
20 Gas was that the engineers can build the pipeline  
21 as they say they can. Can I ask you to assume that as  
22 well.

23 A Sure.

24 Q All right. Now, I suppose  
25 another assumption is that you have to make a choice  
26 between the interior and the coastal. I'm ruling out  
27 the Fairbanks corridor, so I'm assuming those are the  
28 only two choices we have. All right?

29 A Oh, sure.  
30



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1 Q Now, and the next assumption -- not necessarily assumption, but terms of  
2 reference for your opinion would be to include all  
3 mammals, and not just the caribou. All right?

4 A O.K.

5 Q Now are you familiar with  
6 some of the proposals -- not some of the -- some of the  
7 aspects of the proposals for the interior route that  
8 differ from the coastal route, and here I'm referring  
9 to the fact that there would be winter construction on  
10 part of the route -- I'm sorry, summer construction  
11 because of the requirement for a lot of blasting in  
12 the mountainous area. Were you aware of that?

13 A Yes.

14 Q And there would also be  
15 a permanent road constructed in the Canning River  
16 Valley, and I understand that that is required because  
17 it's impossible to put air strips as frequently as it  
18 is along the slope, so that you have an area there that  
19 you have to service by permanent road from air strips  
20 that can only be constructed at certain places. Were  
21 you aware of that as well?

22 A Yes. Are you asking me  
23 to assume that that is necessary?

24 Q Assume that, yes.

25 A O.K.

26 Q Now, with those in mind, and  
27 on those assumptions does it change your view at all  
28 and I'm reminding you I'm asking you to consider all  
29 mammals and not just the caribou, would you still prefer  
30



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1 the coastal route over the interior route?

2 MR. ANTHONY: I think he said he  
3 preferred the interior over the coastal.

4 MR. CARTER: I'm sorry.

5 A Yes, I would.

6 Q Now, in doing so, do  
7 you find it impossible, I suppose, to separate the  
8 wilderness aspect of the North Slope?

9 A Yes.

10 Q So if I asked you to  
11 make a judgment just as a biologist on the impact that  
12 you foresee of just the gas pipeline now on the populations  
13 of mammals, and based on the assumptions that I've given  
14 you, would you be able to give us an opinion, ruling  
15 out the wilderness aspect?

16 A Oh, yes, it seems to me  
17 that it's still -- the fact still remains that the  
18 populations of mammals other than caribou, which you've  
19 asked me to consider that we're dealing with in the  
20 Canning River drainage are localized populations. IN  
21 fact I suppose one could say for example with regard  
22 to grizzly bears that the Canning River is being used  
23 as a dumping ground for nuisance bears from the Trans-  
24 Alaska Pipeline corridor, and also with regard to mammals  
25 other than the caribou I mentioned before my great  
26 concern with the muskox which are using -- have been  
27 introduced into the Arctic Wildlife Range and are  
28 using areas through which the coastal corridor passes,  
29 and I feel that that particular species, although a  
30 lot of information was gathered, did not seem to





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1 receive adequate treatment, either in recommenda-  
2 tions for regulations of construction or in any of the  
3 environmental impact analysis that I've seen done by  
4 Renewable Resources.

5 THE COMMISSIONER: Well, I  
6 think we'll adjourn now. Mr. Carter, you will be able  
7 no doubt to complete your cross-examination in the  
8 morning, and then Mr. Ryder's cross-examination should  
9 enable us to allow this panel to step down by mid-  
10 morning.

11 MR. RYDER: I don't know how  
12 long Mr. Carter has to go, but mine won't take more than  
13 half an hour.

14 THE COMMISSIONER: So -- well,  
15 at any rate you may be standing by with a witness  
16 sometime tomorrow morning?

17 MR. RYDER: I can fill the  
18 morning and part of the afternoon.

19 WITNESS CALEF: Are we convening  
20 this evening as you suggested before noon?

21 THE COMMISSIONER : No, the  
22 consensus is that they prefer not to meet this evening, Dr. Calef.  
23 It's a long day, we have to absorb this material that  
24 you people know so much better than we do, and so  
25 we'll meet at 9:30 in the morning.

26 Oh, Tim Taylor is showing a  
27 movie now about the northern games, and you're all in-  
28 vited to remain.

29 (PROCEEDINGS ADJOURNED TO JANUARY 16, 1976)  
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